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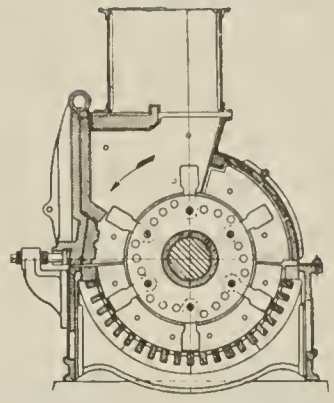

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CEMENT AND ENGINEERING NEWS

with which Gravel & Stone Magazine Is Incorporated

22 Quincy Street, Chicago.

(PUBLISHED MONTHLY)

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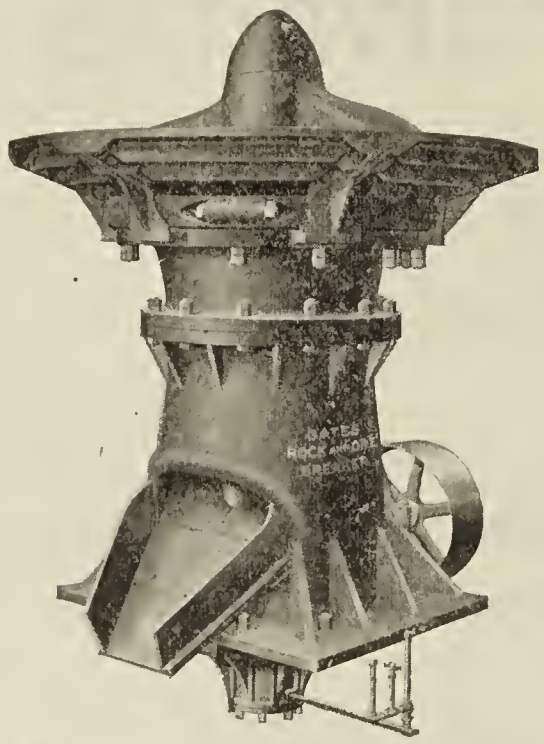

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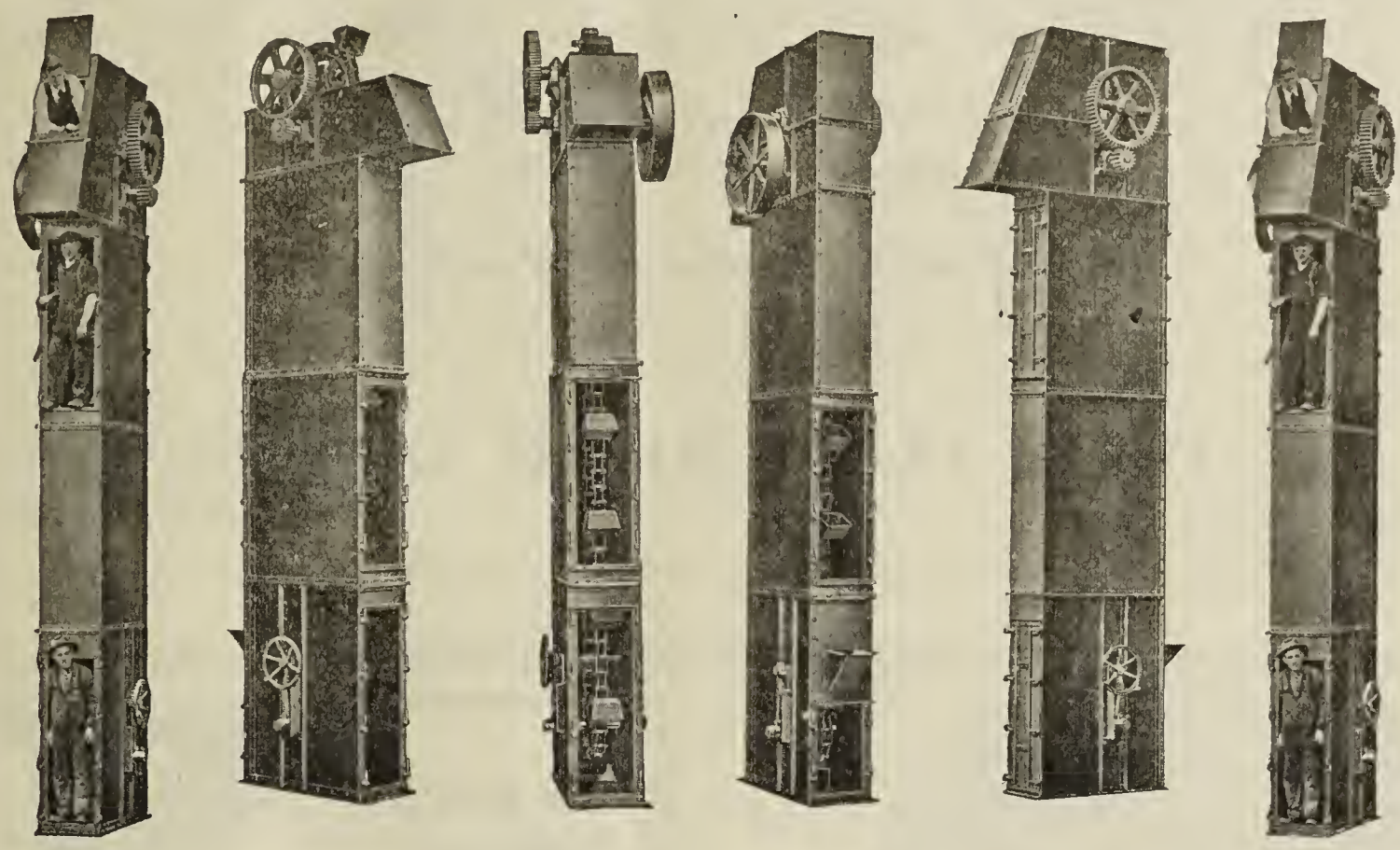

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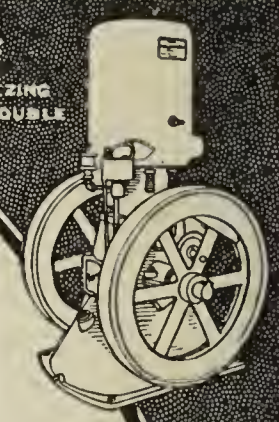

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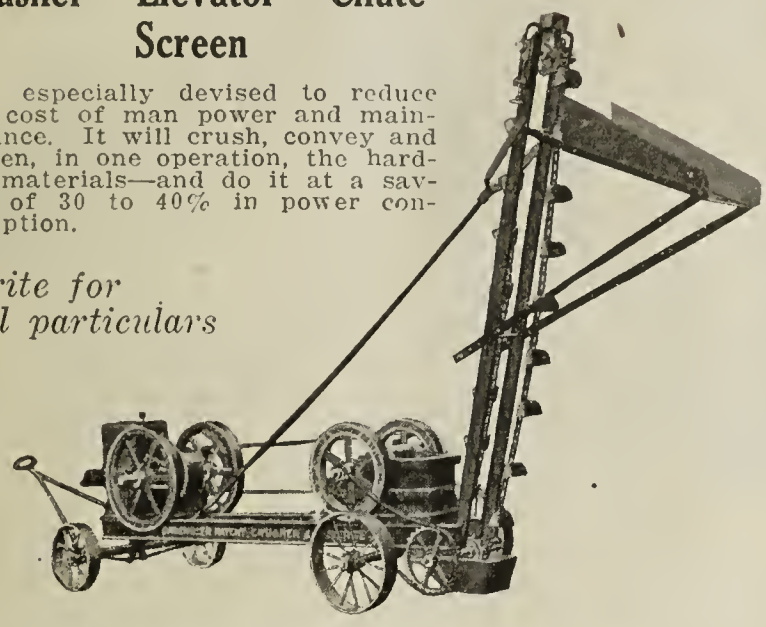

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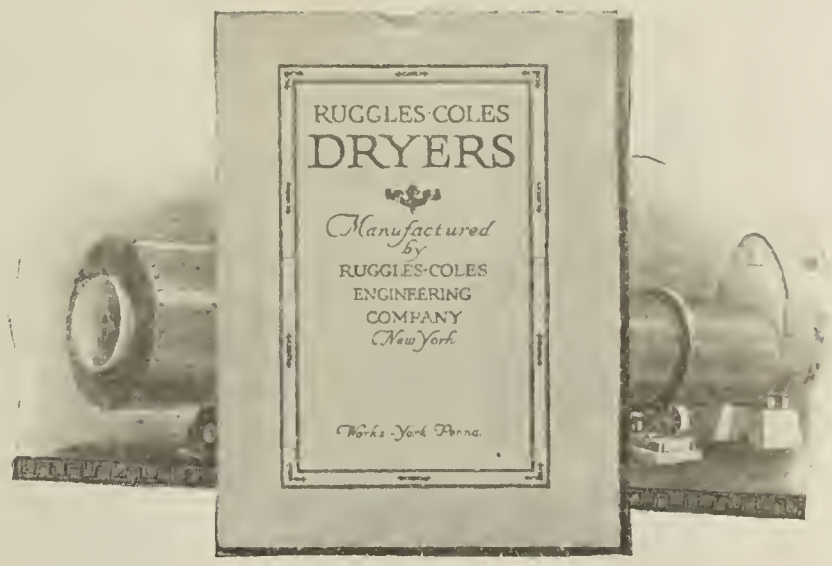

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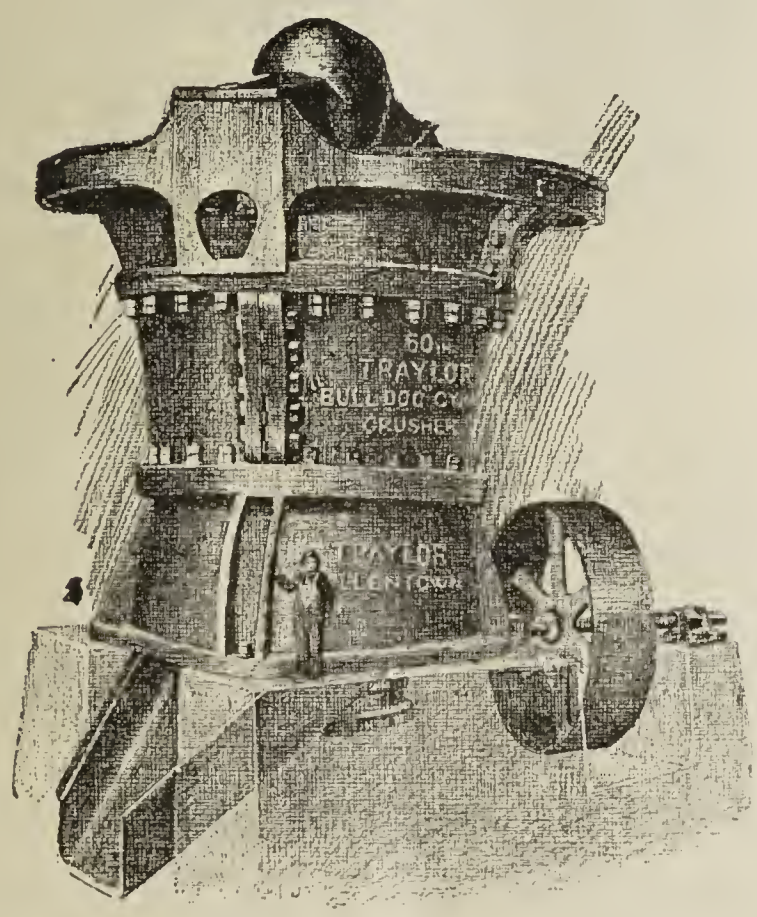

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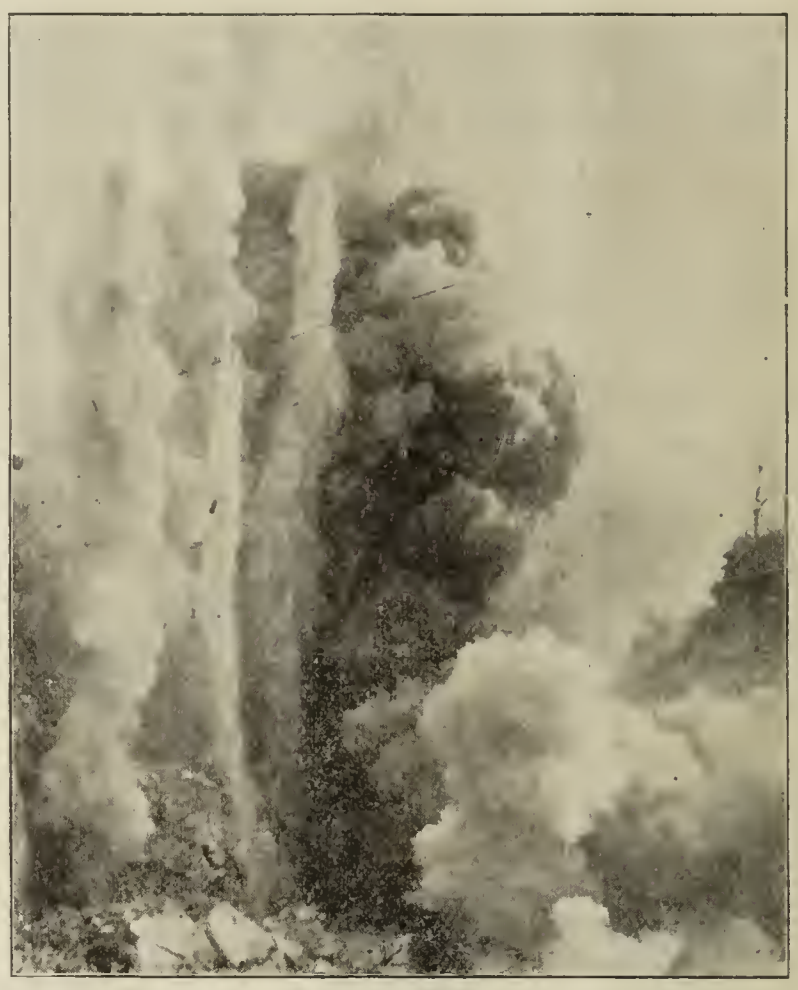

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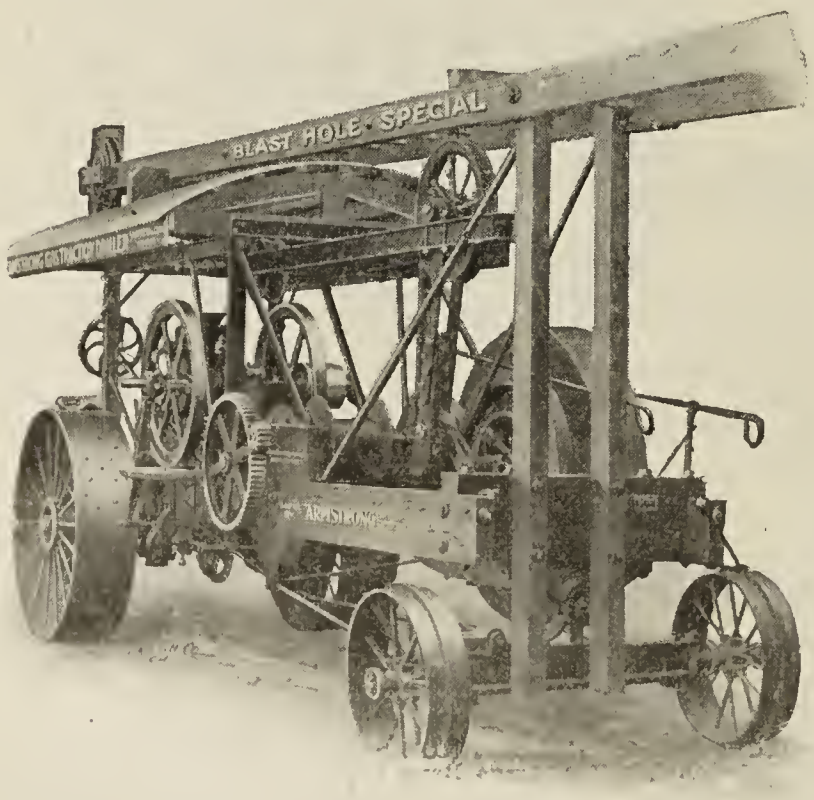
The Economy of Big Blast-Hole Drilling

BIG BLAST HOLE DRILLING MATERIALLY reduces the drilling and the explosive cost per ton of stone displaced—it cuts down the high cost of cleaning benches—eliminates 85 per cent of the delays in the quarry, such as taking up and relaying tracks, delays to the shovels, crushers, etc.—it increases the efficiency of every man and piece of machinery in the quarry, and produces a volume of stone that makes winter drilling unnecessary.



Traction or Non-Traction—Kerosene, Gasoline or Electric Power.

WHY A SPECIAL BLAST HOLE DRILL?

Because a well drill won't produce the results nor stand the punishment. The "Armstrong" special blast hole drill is built for just this sort of work. It has been developed as a unit to insure the greatest economy, speed and efficiency in operation and at the same time form an outfit of the greatest durability.

PROOF OF SUPERIORITY

We guarantee the Armstrong No. 25 Special Blast Hole Cable Drill to drill more hole at less cost in a given time than any Big Blast Hole Drill on the market, and we will write this in every sales contract we make.

WRITE US TODAY FOR FULL PARTICULARS

ARMSTRONG MANFG. COMPANY
DEPT. F.
WATERLOO, IOWA, U. S. A.

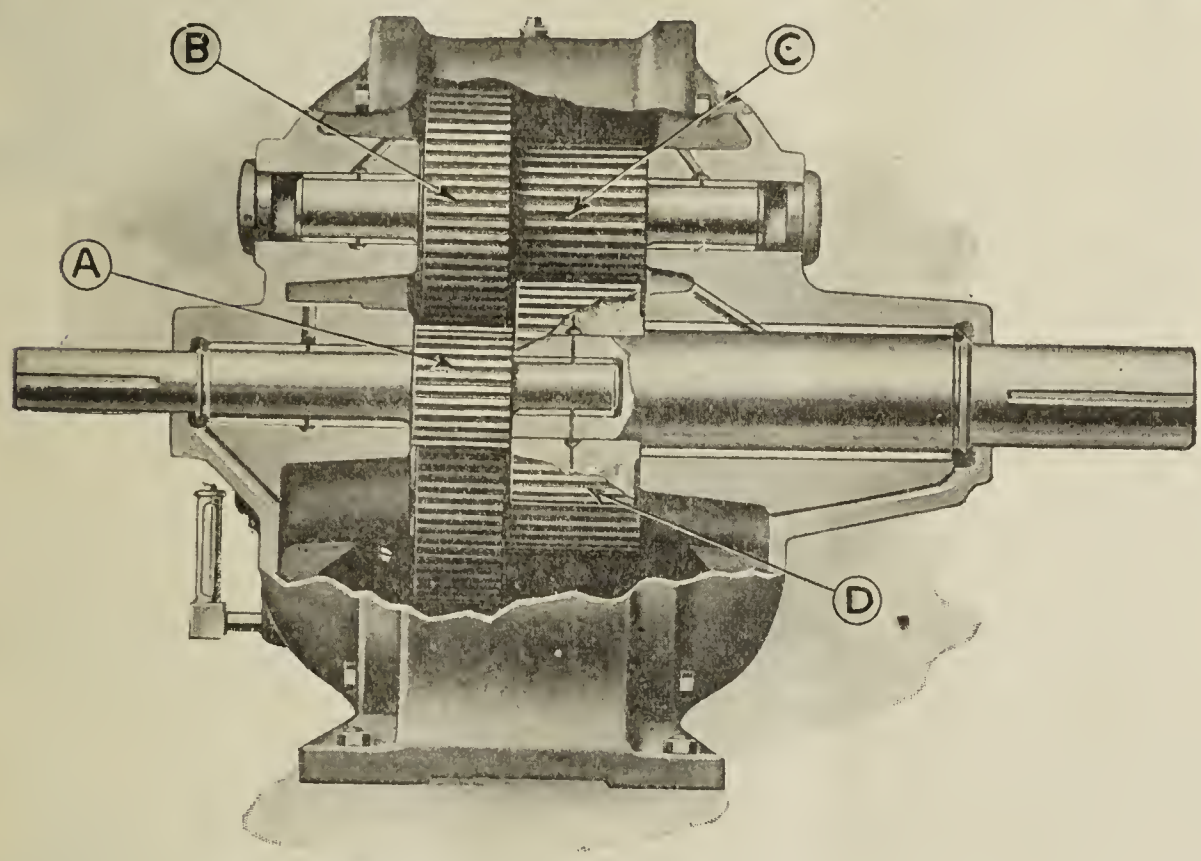
BRANCH OFFICES:
Ft. Worth, Tex., 265 W. 15th St.
Scottsville, Kentucky.
Baxter Springs, Kansas.
New York, 30 Church St.

SALES AGENTS:
H. N. Steinbarger Co., Denver.
The Kaufman Co., Los Angeles.
Collins Ferguson Co., Seattle.
Lund & Co., Salt Lake City.

Jones

Spur Gear

Speed Reducers



A—Pinion meshes with and drives three gears B. B—Gears are mounted integral with the three pinions C. C—Pinions mesh with and drive slow speed gear D.

Wherever it is necessary to reduce speed between motors and driven machines, Jones Reducers are particularly adaptable. They are so compact that they can be installed in very confined quarters, the entire mechanism being enclosed in a cast iron, dust tight housing, which holds an abundant supply of oil, completely protects the gears and bearings, and insures compliance with all safety laws.

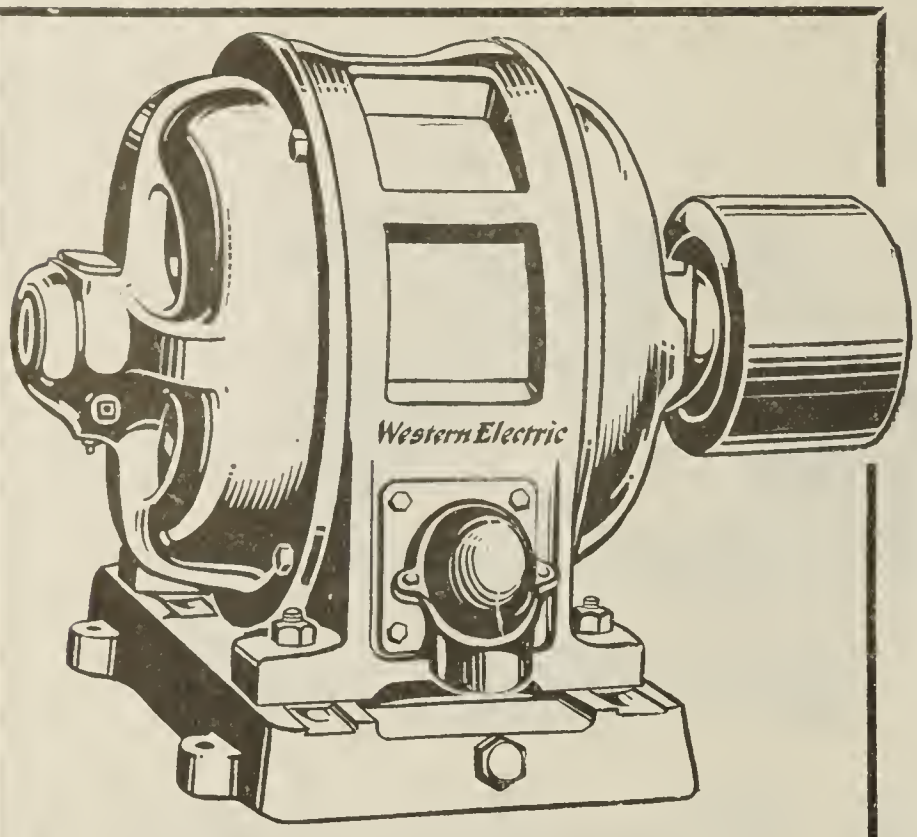
A glance at this section view shows the simplicity of the mechanism—just plain spur gears, with no internal gears or overhung shafts. Reductions in all ratios up to 200 to 1, and even higher, can easily be made.

Write today for Reducer Bulletin. Our engineers are at your service.

W. A. Jones Foundry & Machine Co.
4406 West Roosevelt Road, *Chicago.*
New York 20 Murray St.

J-86

Manufacturers of cast iron pulleys, gears of all kinds, couplings, Lemley friction clutches, Pillow blocks, hangers, speed reducers, and general power transmission machinery.



DID YOU EVER STOP TO CONSIDER

That we have spent years of our time on your electrical problems? Years of untiring efforts which embraced university training, laboratory tests on material, plant analysis, etc? We offer you today the services of men from our organization who can carry your problems through to a successful issue, can meet your emergency just the same as we met others.

We are specialists in Motor Designing, Motor Building, Coil Building and Power Surveys. The knowledge we have gleaned after making a thorough study of cement mill plants and their operation, the experience we have gained through making the cement industry our choice of operations and our factory facilities we offer you now. We know we can be of aid to you and we also know you have your electrical problems to solve.

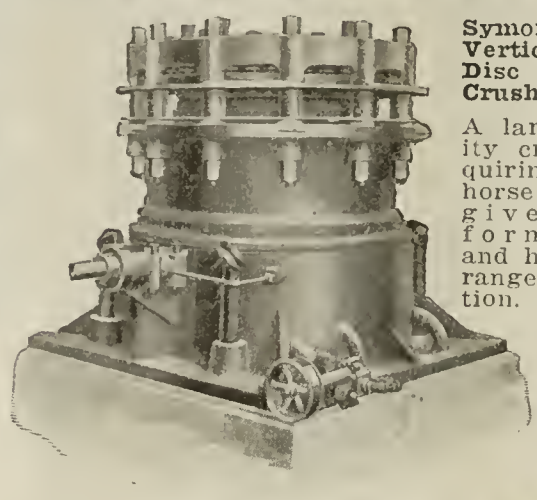
An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States.

Lansing Electric Engineering Co.

All the Name Implies

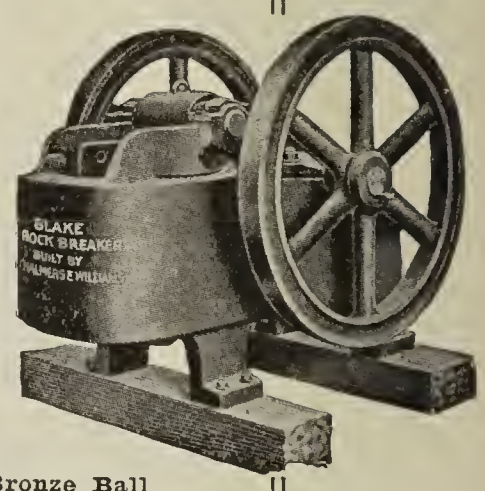
Lansing, Michigan

ROCK CRUSHERS



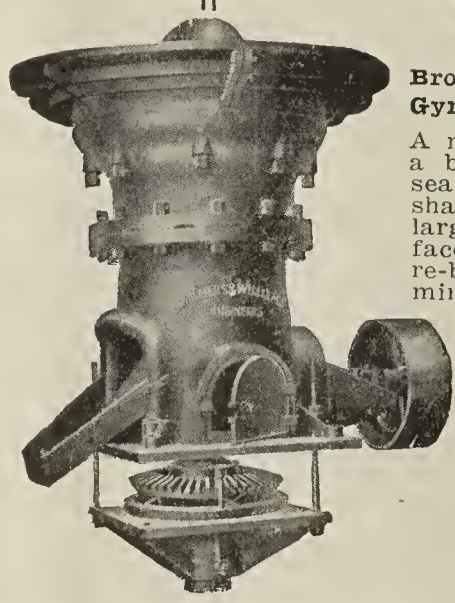
Symons Vertical Disc Crusher

A large capacity crusher requiring low horse power. It gives a uniform product and has a wide range of reduction.



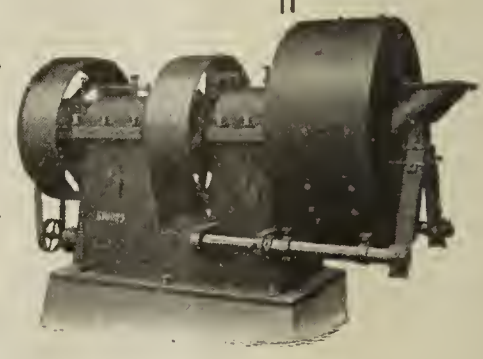
The Blake Rock Breaker

A sturdy design with minimum number of wearing parts. The crushing plates can be reversed and re-used.



Bronze Ball Gyratory Crusher

A machine having a ball and socket seat for the main shaft to give a large bearing surface and to reduce re-babbitting to a minimum.



The Symons Disc Crusher

An improved type with revolving manganese discs which combine a rocking movement to prevent "packing" trouble when small sizes are crushed.

Manufactured and Sold by

CHALMERS & WILLIAMS

1445 Arnold St.
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San Francisco
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SAND PUMPS

That pay the largest dividends per dollar of investment.

"The Pump That Makes The Money."

This Pump is all that is implied in the name Lightening.

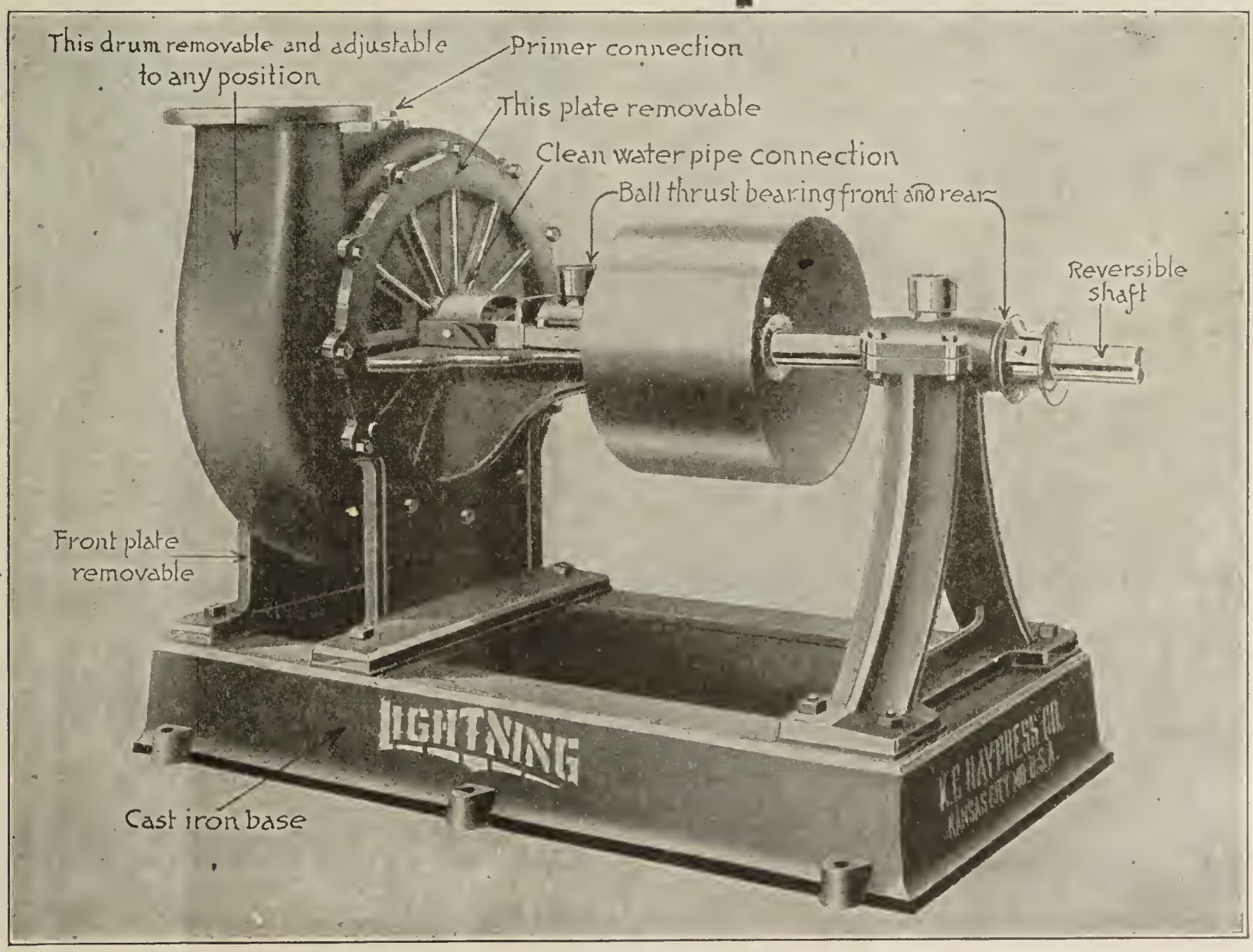
Its rugged construction and Simple operation assures maximum efficiency in operation at all times.

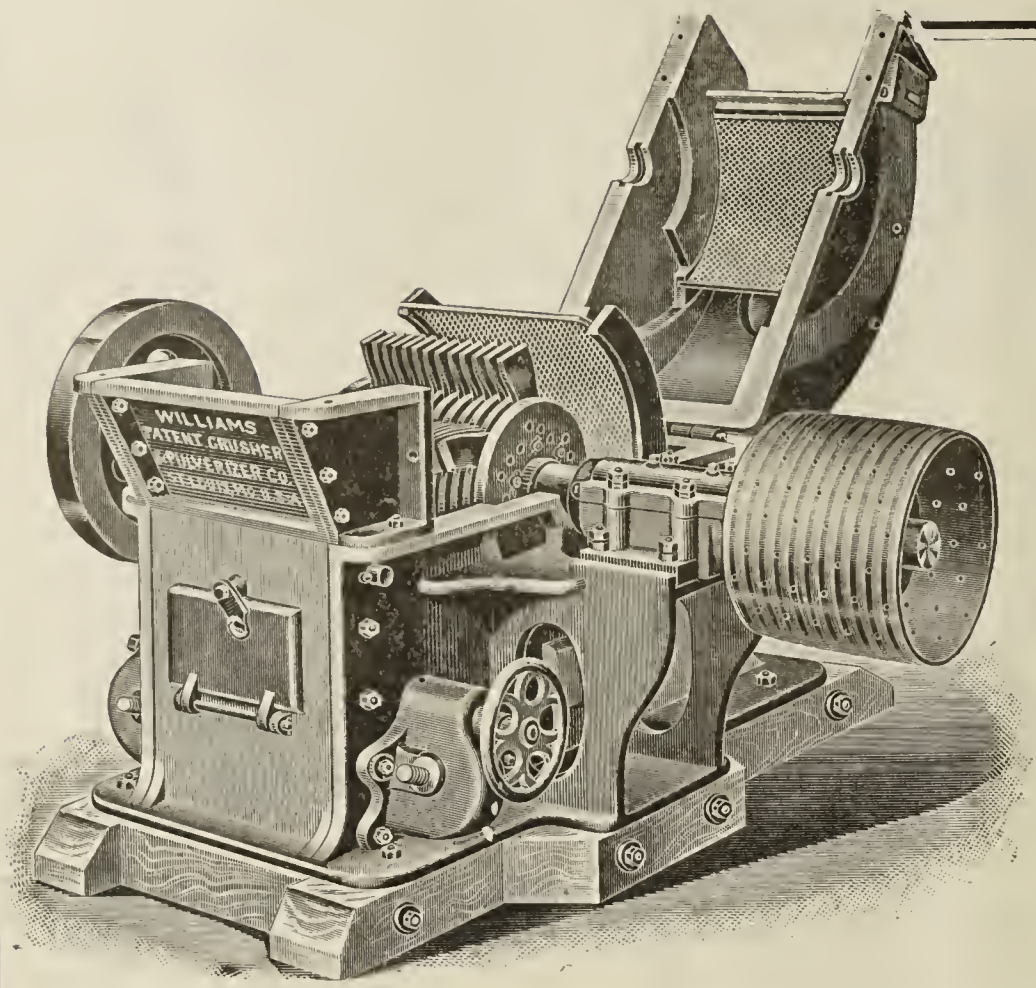
It is easy to adjust and easy to replace parts. Thousands in successful operation are striking endorsement of their dependability.

KANSAS CITY HAY PRESS & TRACTOR COMPANY

KANSAS CITY, MISSOURI

THE PUMP OF SIMPLICITY AND STRENGTH





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LIMESTONE GRINDERS

Take 2 in. to 3 in. dry stone and in one operation, without outside screens or separators will produce 95% through 20-mesh material.

CAPACITIES RANGE FROM ¼ TO 30 TONS PER HOUR

Over 5,000 Williams Mills in Daily Operation.

There is undoubtedly room in your plant for one of these machines, which, in the last twenty-two years have proven that they are money savers, can be depended on, and really have merit. If further information is desired, Write for Bulletin No. 17, which is brim full.

THE WILLIAMS PATENT CRUSHER & PULVERIZER COMPANY

General Sales Dept.—37 West Van Buren Street
CHICAGO

Plant
ST. LOUIS

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SAN FRANCISCO

First Class Silex Slabs

for lining of tube-mills for grinding of Cement, Clinker, Kaolin, Phosphate, Limestone, Quartz, Trap, Coal, Ores, Gypsum, Feldspar, Sand, etc.

Have successfully passed some of the most severe tests. Long life and moderate price. Immediate shipment on stock sizes. Write for prices.

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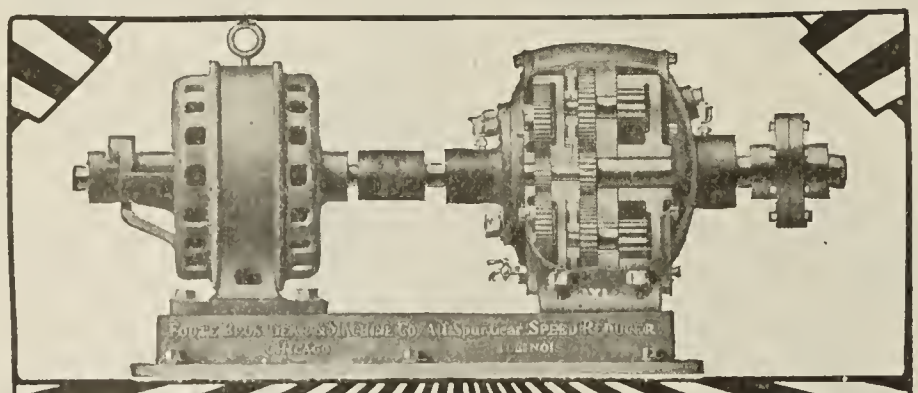


FOOTE SPEED TRANSFORMERS

Write to us, state the conditions that exist in your plant, and get the advice of our engineering department.

FOOTE BROS. GEAR & MACHINE CO.,
228-238 N. Curtis St. Chicago, Ill.

BALLS

Forged steel balls of special analysis steel from 2″ to 15″ in dia. carried in stock. Can't be excelled.

BALL MILL PLATES
CRUSHER SHAFTS
GRIFFIN MILL SHAFTS
GRIFFIN MILL CONVEX SEATS
GRIFFIN MILL CROSSHEADS
PIPE FLANGES
For High Pressure Work
STEAM SHOVEL, TRUCK AND CAR AXLES

Hammer and Hydraulic Press Forgings of all Kinds

We make quick service a feature of our business

TIOGA STEEL & IRON CO.

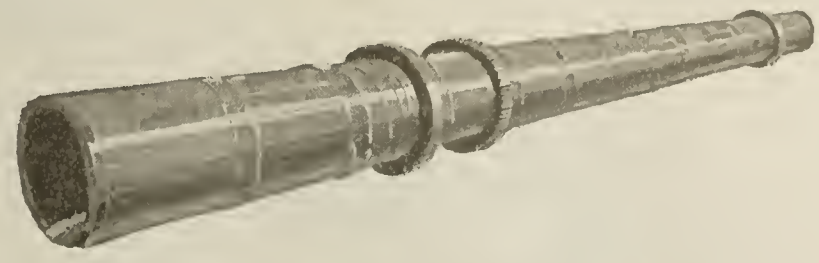
52nd AND GRAY'S AVENUE, PHILADELPHIA, PA.

Fuel Oil Fired Kilns

Fuel supply conditions frequently make the use of oil preferable to coal or gas in rotary kilns for manufacturing cement, burning lime, calcining dolomite, or in other processes involving the use of rotary kilns as one of the steps in economical production.

Numerous VULCAN Rotary Kilns have been built to use oil as the fuel. Our engineering staff is prepared to cooperate with yours in designing any type of rotary kiln best adapted to the process for which it is to be used and to the fuel limitations.

VULCAN Rotary Kilns are used in a great variety of industrial processes.



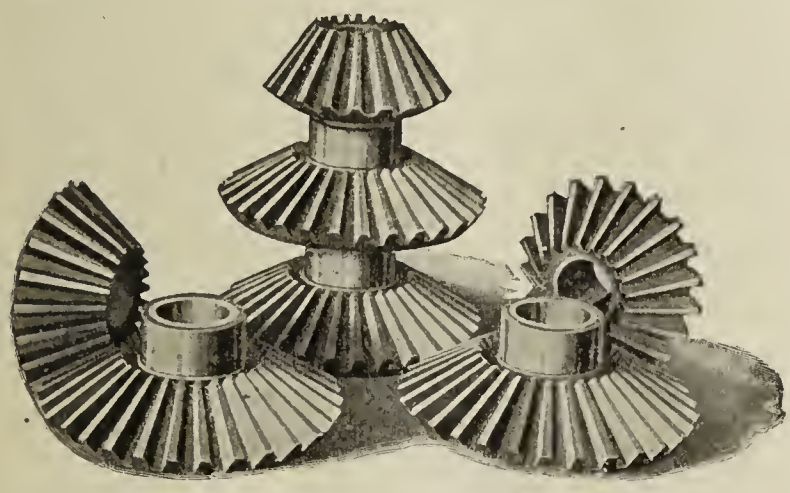
VULCAN Rotary Kilns

Vulcan Iron Works

ESTABLISHED 1849

1740 Main St. **Wilkes-Barre, Pa.**

GENERAL VIEWS OF PLANT OF SOUTH WESTE RN PORTLAND CEMENT CO., EL PASO, TEXAS



Make Your Gear Service a Certainty

Ganschow Bevel Cut Gears—like Ganschow Gears of every kind—are cut with an accuracy and precision which makes smooth, easy, effective working a certainty. They minimize wear and tear and insure long life to the parts. From twenty to forty per cent less power is required to operate

Ganschow Cut Gears

as compared with cast gears, because of evenly-thick and evenly-spaced teeth, and because they are uniformly smooth. Throughout the whole machine the jar and strain are greatly reduced; and this means gear-efficiency from every standpoint.

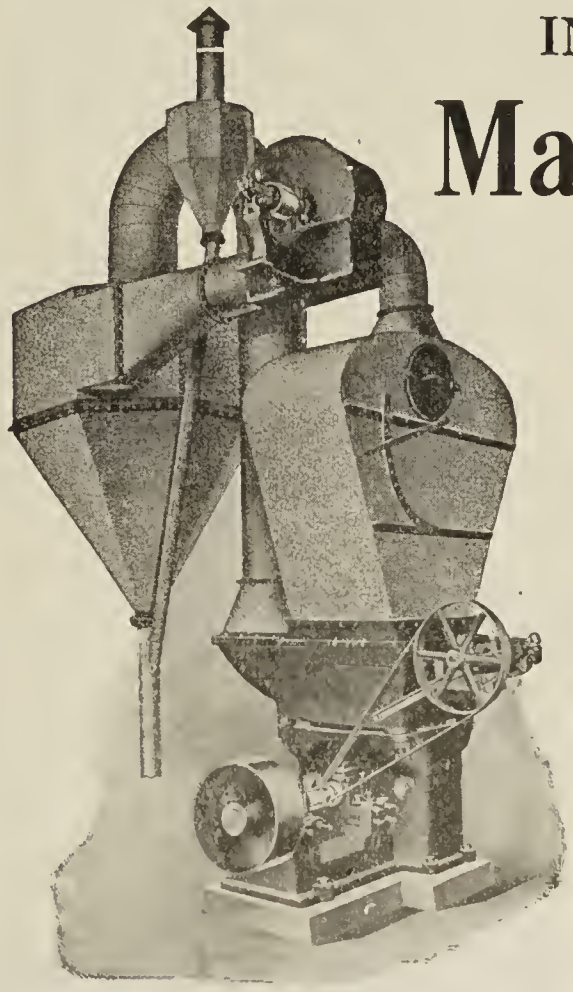
As specialists in gear work, our splendid facilities enable us to take care of any requirement from the smallest gear up to 12 ft. in diameter—and do it QUICK. Every gear strictly according to specifications and free from defects.

How about YOUR gear requirements?

Wm. Ganschow Company, Chicago, Ill.

1003 W. Washington Street

Complete Grinding IN ONE Machine



In successful use grinding Cement, Clinker, Limestone, Coal

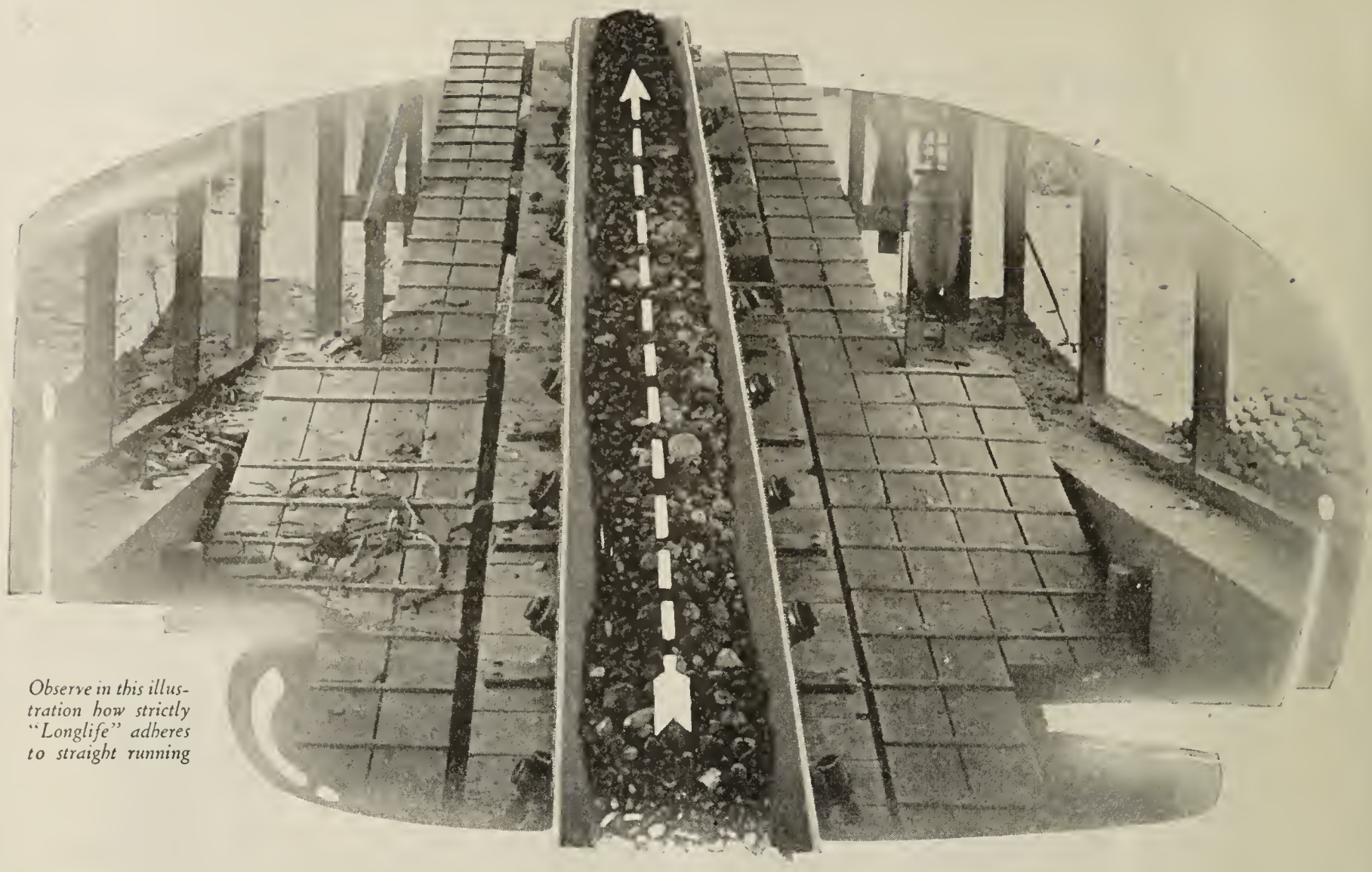
INSTANT REGULATION OF FINENESS

NO DUST

Send for Circular

THE BONNOT CO.

CANTON, OHIO



Observe in this illustration how strictly "Longlife" adheres to straight running

Runs Straight as an Arrow

STRAIGHT running is half the success of economic conveyor service—and it can only come from perfect scientific construction and absolute balance of all elements.

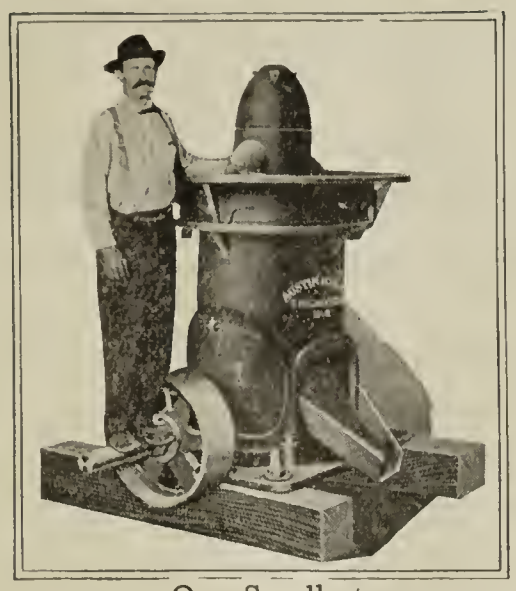
The fact that Goodrich "Longlife" holds the world's record for tonnage conveyed—that it is used in nearly every country on the globe—is substantial proof that it keeps to the straight and narrow path of economy. Buy it for your conveyors. Made in any width demanded by the service.

Goodrich
"Longlife"
Conveyor Belts

THE B. F. GOODRICH RUBBER CO.
Akron, Ohio

TRADE MARK

Best in the Long Run



Our Smallest

When It Comes to Crushing Rock An Austin for Every Job

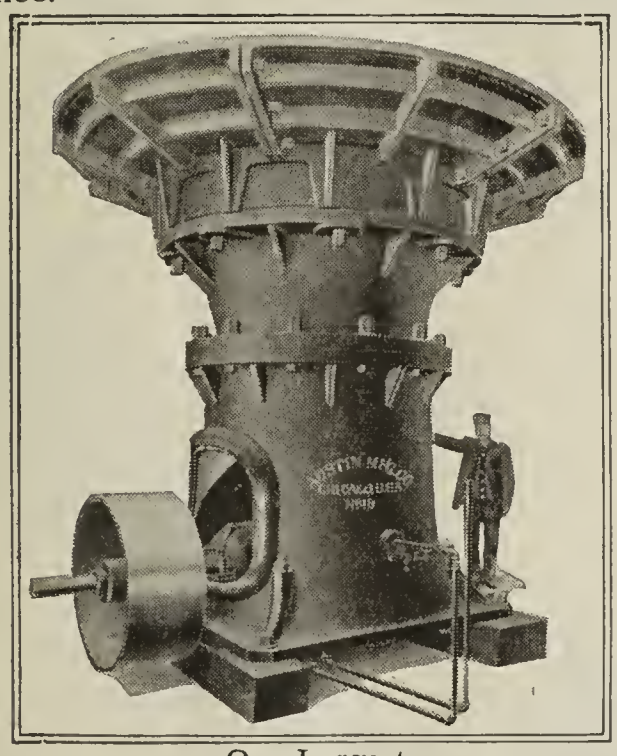
No matter what your requirements, you'll find one of the Austin Gyratory Crushers to exactly suit you.

See the two we picture here. Note the contrast in size. The big fellow dwarfs a husky man.

Eight Sizes 5 to 500 Tons Hourly Capacity

When you couple the superior operating advantages of the Austin Crushers, with the great economies effected by having a machine to turn out just as much rock as you need each hour with assurance of absolute reliability and durability—no waste power or labor—you'll understand why stone producers find Austins so satisfactory.

Catalog No. 28 describes the complete line of Austin Gyratory Crushers as well as other Austin rock equipment. Write for your copy at once.



Our Largest

Austin Manufacturing Company

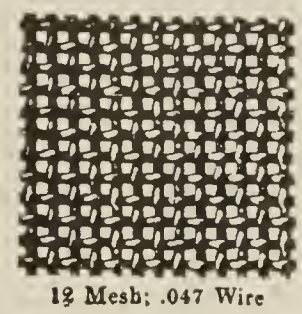
New York CHICAGO San Francisco

Canadian Agents: Mussens Limited, Montreal, Toronto, Winnipeg, Vancouver

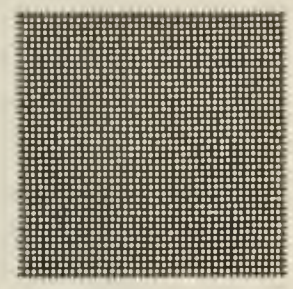
EXPORT DEPARTMENT
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA

Cleveland Double Crimped WIRE CLOTH

2½ Mesh; .105 Wire



12 Mesh; .047 Wire



40 Mesh. 0135 Wire

You should use our screens because a uniform fineness of screened product is assured by an even, accurate mesh. This is a characteristic of "Cleveland" Double Crimped Wire Cloth.

Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

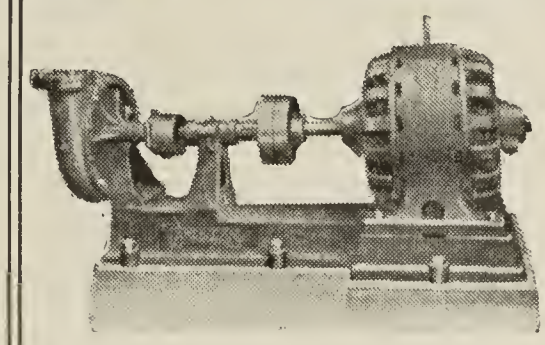
The Cleveland Wire Cloth & Mfg. Co.

3579 E. 78th Street, CLEVELAND, OHIO

AMERICAN

TRADE MARK REG'D. U.S. PAT. OFFICE

PUMPS



Built to Meet All Possible Power Plant Requirements

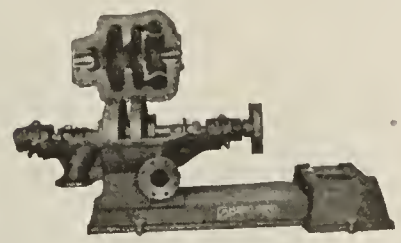
Fifty standard types of centrifugal pumps regularly built and special designs as wanted.

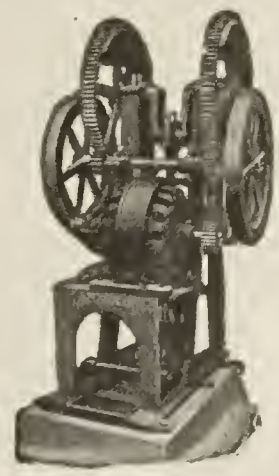
Also a complete line of deep well plunger pumps.

Write for Catalogs.

The American Well Works

General Offices and Works: Aurora, Ill.
Chicago Office: First National Bank Bldg.





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VALVE BAGS
INSURE SAFE DELIVERY

If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

THE VALVE BAG CO. OF AMERICA
TOLEDO, OHIO

AJAX CONVEYOR BELTING

IN the Ajax Brand Rubber Conveyor Belting we offer a first class belt for ordinary conveying purposes. The duck and rubber is of good quality and will compare favorably with the good belts now on the market. We make it with a flat or convex surface, and with a cover varying in thickness from one-sixteenth inch to one-fourth inch. For conveying coal, sand, gravel, stone, etc.

Advise us regarding your installations. We make belts for every purpose.

Conveyor Belts	*Transmission Belts*	*Packing*
Elevator Belts	*Hose—all Kinds*	*Valves, etc.*

The Gutta Percha & Rubber Mfg. Co.
301 West Randolph Street
Chicago, Ills.

New York Boston Seattle
San Francisco

Editorial

A Strong, Progressive Sales Policy Is Necessary for Success in 1921

During the past four years, it has been so easy to sell and advertise goods that our sales instincts have stagnated. In many cases neither selling nor advertising has been necessary—it took little to start and keep up sales.

As a consequence of this four year period of mental and physical inactivity our salesforces have become flabby. Like a colt confined in a box stall, the old power and pep have withered.

So—when, as now, we have to once more become aggressive salesmen—prepare for strenuous work of mind and body—we have somehow lost the old time punch and are too satisfied to sit around accepting conditions—making no effort to better them.

Salesmanagers, salesmen, retailers, advertising men—we must quit "marking time"—accepting things as inevitable. The time has come for a change of front—it is time to stop taking orders and start selling goods.

A careful study of the fundamentals underlying Business will convince most people that the chances for good business during the next year are right. For a long time we have been accepting excuses. A tremendous amount of liquidation had to be put through. This is rapidly being done and will be speedily completed. A Party has been put in power according to the wishes of a very large majority. The crops of the country are bountiful.

Six months ago, manufacturers said it was absolutely ridiculous for them to push business, because they could not get their raw material in from the railroads, and three-quarters of the time they could not ship it out because of embargoes and freight congestion. The aspect of transportation has changed a great deal in six months. Although money is scarce and high, any student of Economics recognizes that, as the value of commodities diminishes and as reductions are liquidated, less money will be required.

One year ago, in January, we were facing (with all the bad conditions) a probably poor year. Now, with most of the issues settled, we are approaching a good year. Mr. B. C. Forbes, in a recent article, said: "Before a ship goes into action, it is necessary to clear the decks. The business decks are rapidly being cleared and we should be ready, in 1921, to go into action."

Conditions are now right for entering into a new year, but we must have the old-time punch in the sales and advertising. Vacation is over—it is time to go to work again.

Lay out a progressive, aggressive sales policy for 1921—sell yourself on the idea that it's going to be a successful year. Then call in your entire force—inspire them with the same attitude—start an old time intensive sales drive—accept no longer mediocre work from anyone in your employ.

Spread this spirit throughout your dealers—make your salesmen talk prosperity and business, not hard times and slack days. Use your trade papers to carry this message of a bigger and better 1921. The dealers will respond—their shelves are sadly depleted.

The people of the country want goods—the people of the country will buy your goods—but they have got to be sold. Flabby, half hearted salesmanship and advertising will not do it.

The time has arrived for hard work on the part of all who distribute merchandise. If we do this now "business depression" will soon become "business expansion."

Water-Power an Inexaustible Source of Energy

Eventually we shall be compelled to supplement and in large measure supplant the use of coal and petroleum through the development and utilization of the nation's vast water-power. Once installed, hydro-electric plants are operated at comparatively low cost. The chief carrying charge is the interest on the investment. The source of the energy, moreover, does not give out.

The principal progress in this regard promises to be the linking of scattered water-powers in comprehensive undertakings, including the co-ordination of carbo-electric with hydro-electric undertakings.

Fortunately, those regions, generally speaking, which are without coal are best supplied with potential water-power. By linking steam generating plants at the mouths of coal mines with hydro-plants, great areas may be supplied with power economically.

It is by no means an untried field into which capital is invited by the fuel problem and the liberalization of the Federal Government's control of water-power development. The growth in water-power installations in recent years, despite certain deterrent influences, is suggestive of the progress which it is reasonable to expect in the near future.

In 1901, when the Federal legislation was enacted under which most of the water-power development of the country has taken place, there was less than 2,000,000 horsepower in use. It is estimated that at the beginning of 1920 the development reached 9,823,540 horse-power, or one-sixth of the maximum potential resources. By geographical districts those power developments are distributed as follows:

	Horse-power	Per cent of total developed
New England States	1,506,500	15.3
Atlantic States	2,952,850	30.1
Central States	2,699,200	27.5
Mountain States	1,113,990	11.3
Pacific States	1,551,000	15.8

The Atlantic States south of New England lead the country in water-power development. Among the individual states New York holds first place, with 981,-

520 horse-power developed; California, with 942,000 horse-power, is second; and Maine, with 780,000 horse-power, is third.

Standards for Concrete Products

In response to his request for suggestions, R. F. Havlik, Mooscheart, Ill., Chairman of the Committee on Concrete Products, of the American Concrete Institute, has received a letter from a manufacturer of concrete brick indicating the need for study of concrete building units of various kinds. The letter is of such general interest and indicates so clearly work that needs to be done that it is quoted in part as follows:

I believe this committee should collect data concerning the structural characteristics of concrete products.

Concrete products are used to a large extent as a substitute for other building materials. They are very often required to meet results obtained in testing these other materials. Such results are not always a true indication of the structural value of such materials, but frequently an indication of the quality of such materials.

I have in mind the compressive strength of clay brick. The results obtained in testing clay brick in compression are not used in the structural design of a brick masonry wall. Instead the compressive test results are an indication of the hardness or degree of burning of such clay bricks. Is it fair, therefore, to require concrete products to develop the same compressive strength?

This condition is caused primarily by the lack of active information regarding the structural qualities of concrete products. If it were generally known what a concrete block, or concrete brick, or concrete tile, made under proper conditions, would do under certain conditions, then architects and engineers would be willing to accept as a standard specifications based on the characteristics of concrete rather than on the characteristics of clay or some other building material.

In brief, specifications for concrete products should be based on concrete as a material and its characteristics rather than on clay or whatever other material it replaces.

I believe that this is proper work for this committee to initiate and undertake, with the co-operation of the Bureau of Standards, American Society for Testing Materials and the Portland Cement Association.

The Back Plastered Metal Lath and Stucco House

The following communication from the Associated Metal Lath Manufacturers, 740 Edison building, Chicago, may be of interest to our readers, viz.:

"We wish to invite your special attention to the Back-Plastered Metal Lath and Stucco House in the Small House Competition that is to be held in conjunction with the "Own Your Home Exposition," approved by the American Institute of Architects.

"This is the first time that the details for successful stucco as determined by the American Concrete Institute have ever been required in a nation-wide competition for design in a stucco house.

"We are prepared to furnish to every architect the essential features that should be incorporated in such a design and we believe that the attention of architects should be drawn to these details.

"Stucco is undoubtedly being mistreated, and many details are being constantly overlooked. For instance: Just the simple matter of the metal stop nailed at the end of a window sill and the proper drip, will avoid one of the most flagrant errors as often found.

"The use of back-plastered construction with the elimination of the sheathing has been found by the U. S. Bureau of Standards, American Concrete Institute and general practice to be more permanent and less expensive, and at the same time to be the best insurance against cracking. It is a fact that should be generally recognized by the architectural profession."

A Concrete Hardener of Merit

The U. S. S. Lead Refinery, Inc., East Chicago, Ind., manufacturers of a high quality concrete hardener, a liquid chemical to be applied to new or old concrete have the following to say concerning their product:

"Our material was introduced to the market in July, 1919. Prior to that time and back to 1906 we produced and marketed the basic acid from which some concrete hardeners are manufactured, and, after extensive investigations by our Research and Engineering Departments, we decided to introduce an improved and finished liquid chemical hardener to the market—one which would do more than harden the concrete in that it would prevent the concrete from absorbing oil and water and also cause properly treated concrete to be highly resistant to the action of acids.

"Appreciating that it takes time to get a report of service on such an article as we offer, we have not asked any of our many customers for a report on results obtained, preferring to wait at least one year from date of application of the chemical. The first large job we obtained was in August, 1919, when we furnished the chemical for the treatment of all the old concrete floors of the main plant of the Willard Storage Battery Company, 246-286 E. 131st Street, Cleveland, Ohio, where they had battery acid conditions to contend with on the floors of their charging rooms. That they obtained satisfactory results is indicated by a letter sent us voluntarily last March.

"For your further information we will say that our material is not a paint or a filler which might require renewing at the end of several weeks, months or years; having a fluosilicate base, it acts chemically on the concrete, new or old. The chemical action takes place not only on the surface but penetrates to a depth of one-eighth inch or more so that the one-eighth inch or more skin has entirely different characteristics than the underlying concrete. On the other hand, the strength of the concrete is not affected as the surface skin is not relied upon for the purpose of strength.

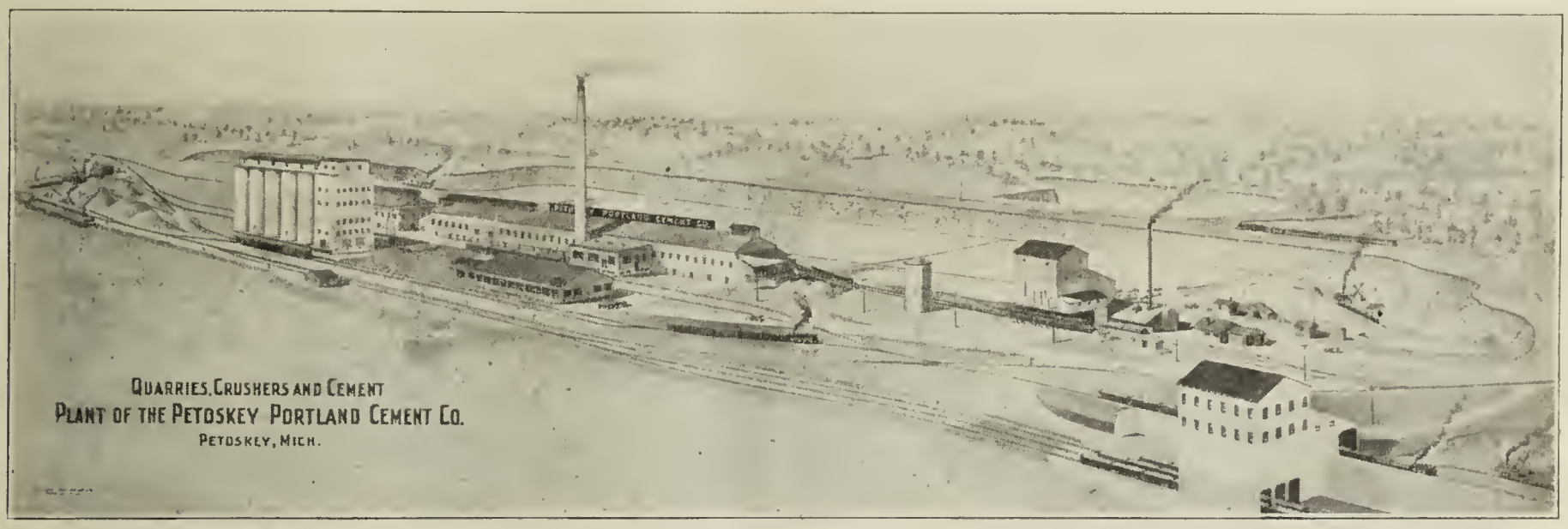
"This company is owned in its entirety by the United States Smelting Refining and Mining Company of Boston and elsewhere; its principal Research Laboratories are maintained at the Massachusetts Institute of Technology. We mention this merely to show that a company of our standing and responsibility would not offer a product without merit."

The New Petoskey Cement Mill

More than 3,000 stockholders are sharing in the result achieved through the initiative of A. B. Klise, John L. A. Galster and Homer Sly, prominent Petoskey, Mich., business men who rubbed the Aladdin lamp four years ago and organized the now prosperous company which now owns nearly three miles of Little Traverse Bay shore line, all of which is underlaid with hard stone capable of being turned into the finest cement, and also of producing the best of roads.

Located three miles west of Petoskey, with more than 100,000.000 tons of stone available above the lake level, and doubtless much more below, if it ever is needed, this treasure was explained to men of Petoskey, Grand Rapids and Louisville, and to others who come north each summer, and construction work was started in the spring of 1919.

The overburden of soil is so slight that the stone is obtained economically, and many thousands of tons are released at a single ignition, which fires a number of dynamite cartridges. Trains of 10 cars convey the raw material to the crushing plant, which is equipped with Allis-Chalmers crushers. This building is of concrete and steel structure and fireproof. Stones the size of an office desk are reduced with ease. The capacity of this crushing plant is 2,500 tons per 10-hour day. Ten cars a day will be required for this concern, which is known as the Petoskey Portland Cement Company, and a like amount of the Newaygo Portland Cement Company.



The cement plant of the Petoskey concern was designed and built by J. C. Buckbee Co., engineers, Chicago. It is of steel and concrete construction and fireproof. The ingredients used are lime, alumina, silicia and iron. The machinery is the most modern obtainable. The raw materials are ground in large mills known as Compebs, manufactured by Allis-Chalmers Mfg. Co., which receive the stone and shale in pieces as large as a hen's egg and reduce them to the fineness of flour. Each of these machines is driven by a 400-horse power Allis-Chalmers motor directly connected. A 42-inch Fuller-Lehigh pulverizer mill is installed for coal grinding.

The wet process is used, and the ground raw material, or slurry, is pumped from the raw compebs by compressed air pumps into large circular concrete containers, known as slurry tanks, which store enough raw material to make 7,000 barrels of cement, thus furnishing more than three days' supply for the Allis-Chalmers kilns at all times, and providing for the exact standardization of the raw materials.

The slurry is pumped from the storage tanks into the upper end of the kilns, which are 10 feet in diameter by 150 feet in length, lined with Harbison-Walker fire brick throughout, and mounted on rollers on which they revolve very slowly, making a complete revolution in about 90 seconds.

In the Petoskey mill the waste gases of the kilns are used to make steam of 175 pounds pressure which operates the great turbines that furnish the electric power for the entire works, two Edge Moor waste heat boilers and one auxiliary boiler (horizontal water tube) have been installed. This will save the company upwards of 15,000 tons of coal annually, which, at present prices, would mean a saving of $75,000 to $100,000 a year. There is a store-house capable of storing 100,000 barrels, also offices and a completely equipped repair plant. The stock house is equipped with two Sturtevant separators. Standard gauge railroads, many cars and several engines operate. A traveling crane will lift a box car with ease.

The cement plant is designed to turn out 2,500 barrels every 24 hours, and is so arranged that additions may be made to multiply this output. Ten thousand barrels a day is the expected output within a few years.

A remarkable feature of the plant is its dock on the shores of Little Traverse Bay. It is one of the finest on the lakes for the accommodation of lake and ocean going vessels, is 350 feet in length and affords 23 feet of water at its edge. It is of concrete throughout and is anchored to the bottom of the bay. With the Pere Marquette and Pennsylvania railroads to supplement vessels, transportation facilities will be of the best.

To sum it all up, it may be said that as steel is to Pittsburgh, so will cement and crushed stone be to Petoskey.

TEXAS SAND AND GRAVEL MEN ORGANIZE

At a meeting held in Dallas on October 13 sand and gravel dealers of Dallas and other points in the State organized the Texas Sand and Gravel Association, with B. O. Johnson, president, and E. Guy Sutton, business manager. The Dallas branch, together with similar branches in Houston and San Antonio, was used for a nucleus for the State organization.

Mr. Sutton, business manager, told the association that preference had been accorded the coal interests by a ruling of the Interstate Commerce Commission in the matter of open cars.

"As long as this condition exists, building of any kind will be practically stopped, for the producers will be unable to supply the contractors with sand and gravel, and these commodities are absolutely necessary for construction," he said.

Cumberland's Concrete Water Supply Main

More than a mile of 3-foot pipe shipped 300 miles by railroad and laid in inaccessible crooked trench on the mountainside. Method of manufacture in yard. Special flexible joints tight under 70-foot pressure head. Method of calking joints without impact. Behavior of joints under combined pressure and deflection test.

The water supply of the city of Cumberland, Maryland, has been delivered through a wooden stave pipe which, having shown signs of deterioration, has recently been replaced, under the direction of James H. Fuertes, consulting engineer, New York City, by 6,000 feet of reinforced concrete pipe 4 inches thick and 36 inches inside diameter, manufactured by the Lock Joint Pipe Company, Ampere, N. J., shipped about 300 miles to Cumberland, Md., on railroad cars, and installed by the Vang Construction Co., contractors.

The pipe is of the general bell and spigot type manufactured in 12-foot lengths weighing about 6,000 pounds each, and provided throughout with special flexible joints that permit sufficient longitudinal expansion and contraction and transverse deflection to allow the pipe to automatically accommodate itself to curve, grade, and all the irregularities of location or installation and maintenance without developing leaks or fractures.

Pipe Jointed in Trench, Tested and in Service

Standard Length of Pipe and Joint Detail

This patented joint has recently been introduced and was used for the first time on this installation. It is commercially designated by the manufacturers as their "lead and iron expansion joint."

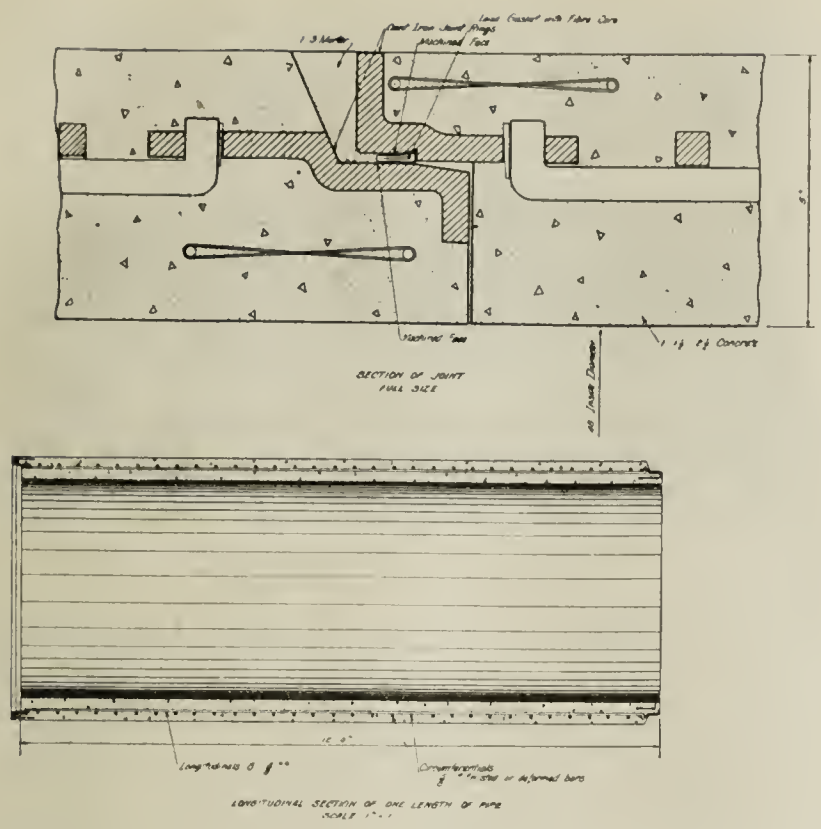
Special Joints

In each end of each length of pipe there is moulded and securely anchored to the body of the concrete, a cast iron ring previously machine finished over part of its surface. The bell ring is about 4 inches long and the spigot ring 6 inches long, and their combined weight is approximately 230 pounds for the 36-inch pipe.

At the outer end of the bell ring the inner surface is machined for a length of about ¾ of an inch to a true cylindrical surface, beyond which it is tapered for about ⅜ of an inch to a larger diameter, thus forming a groove, having a wedge shape cross-section in the casting with the thin edge of the wedge toward the end of the pipe.

The outer end of the spigot ring is machined, tapering so as to form a truncated cone about 1 inch long, clearing the inner surface of the bell ring. Beyond the conical surface the exterior of the spigot ring is machined to a true cylindrical surface extending to intersection with a shoulder nearly at right angles to it.

When the spigot end of one pipe is assembled in the bell end of another pipe and the joint is completed, the cylindrical part of the spigot ring is opposite the wedge-shape recess in the bell ring, and the space enclosed between the two at this point is tightly filled by a lead gasket which, flowed into the wedge-shaped groove, locks the two pipes together. The clearance



between the shoulders of the bell ring and spigot ring is filled solid with cement mortar. The clearance of about ½ inch between the ends of the pipe and that between the tapered end of the spigot ring and the cylindrical end of the bell ring allow for considerable angular displacement between two adjacent lengths of pipe which, together with longitudinal movements of expansion, have been found to take place without impairing the efficiency of the lead calking.

For these joints there has been devised a special gasket consisting of a ring made of lead pipe filled with a fibre core, which in this case was made with ½-inch pipe. The gasket is flattened to a peculiar shape, rolled to a proper circle and the ends soldered together making a ring about ⅜ inch thick and ¾ inch wide.

When the pipe is laid the gasket is placed in the groove in the bell, bearing against the shoulder at the rear end of the groove. When the spigot end is inserted in the bell the tapered portion of the spigot ring is centered in the gasket and takes bearing there so that as the pipes are forced together the wedge action of the conical surface develops a heavy pressure against the gasket, causes the lead to flow, and makes a pressure contact for nearly its full width on the machined surfaces of bell and spigot castings. It automatically adjusts itself to any movement or displacement of the pipes and thus forms and maintains a pressure tight joint.

Manufacture of Pipe

For this work the pipe was manufactured at the headquarters yard of the company at Ampere, N. J., and shipped by rail to Cumberland because the amount of freight involved was not as great as the cost of erecting a local plant for the manufacture of the pipe at the site, as is frequently done. The pipe was cast in vertical collapsible steel forms set on horizontal platforms adjacent to the service track in the casting yard. The interior sheet steel form was put in position and enclosed by the assembled longitudinal and transverse reinforcement bars connected to the bell and spigot joint rings accurately spaced in position. The longitudinal halves of the sheet steel outside form were assembled together around the reinforcement and the 1:1½:2½ concrete was poured into the top of the form from a special conical steel bucket. The flow from the bucket was accurately controlled by a ball valve in the pointed lower end of the bucket which permitted the concrete to be accurately delivered to the narrow annular space between the inner and outer forms. The buckets were handled from a traveling derrick, and after the pipes were sufficiently hardened they were stripped, supported by a special adjustable sling suspended from a traveler, and moved by it to the required position and lowered to horizontal position for seasoning on the storage skids whence they were loaded on railroad cars for shipment as required. The contractor's yard is provided with a fabrication shop equipped with machine tools for finishing the joint rings, making forms and bending, cutting and assembling the reinforcement steel.

The Lock Joint Pipe Company maintains pipe manufacturing yards in twelve states in different parts of the country, enabling large and small water, sewer and culvert pipe to be advantageously manufactured in them and shipped to the site where the distance transported is not so large as to involve freight charges greater than the saving over some other type of pipe or the cost of establishing local manufacturing plants. The weight of the pipe is approximately 50 per cent greater than that of standard cast iron pipe of the same diameter.

Trenching

The difficulty of the work was considerably increased by the fact that the full length of the new line was located on the mountainside in a trench that was absolutely inaccessible except from the end, and in many places the grade was very steep. The inaccessible location prevented the installation of excavating machinery so that the work was all executed by hand.

A large quantity of rock was encountered and was removed by hand drilling, blasting, bull pointing and sledging, usually being shoveled or thrown out of the trench by hand. At one point where the maximum depth of the trench reached 18 feet for a length of 200 feet, the excavated material was shoveled into buckets handled by a traveling derrick. The depth of the trench varied between wide limits, in some cases being only half the diameter of the pipe. A trench was excavated entirely in advance of the pipe laying by ten parties located at intermediate points and working for several months.

The pipe was delivered from the railroad to one end of the trench by trucks, from which it was transferred to a temporary service track laid in the bottom of the trench and the pieces taken on it, one at a time, to their required position in the line where they were unloaded and subsequently assembled by the use of an ordinary tripod and hand tackle.

Making Joints

The pipe lengths were laid spigot end ahead, and

Inside Forms and Reinforcement for Pipes Assembled in Casting Yard

each successive pipe length supported in a sling suspended from the laying derrick was held by the derrick until the spigot was entered in the lead gasket in the bell ring and the jointing apparatus was put in operation.

A ¼x10-inch semi-circular steel band having at each end a sheave pivoted to the outside, was fitted to the upper side of the last pipe at the center point. Passing underneath the pipe and through the sheaves in the band, there was led a ⅝-inch chain connected to two horizontal longitudinal bars running along the side of the pipe and passing through a horizontal transverse bearing beam, called a "strongback," bearing diametrically across the end of the pipe length being laid. The threaded ends of the bars were fitted with bronze nuts bearing on washers on the strongback and were turned up with ratchet wrenches.

The wrenches were operated to pull the spigot about 1¾ inches into the bell and gasket, and as the spigot advanced, its conical end radially compressed and

Handling 6-Ton Pipe Sections in Casting Yard

calked the lead gasket forcing it against the shoulder of the bell and making it completely fill the wedge shaped cavity there.

When the pipe was pulled home the cone end of the spigot had passed beyond the lead gasket and the gasket was fitted tightly between the two concentric cylindrical machined ring faces, the outer circumference of the gasket being anchored to the ————tion of the spigot cone, formed a very efficient stuffing box, maintaining the tightness while it permitted movement of the pipes.

The elasticity of the fibrous core of the gasket is so great that when the pipe is deflected out of line a considerable spring is developed in the gasket sufficient to be noticeable when the pressure on the gasket is

Loading Pipe for Shipment

released. The force required to pull together two 36-inch pipes is approximately 25,000 pounds, which suffices for the very satisfactory expansion of the joint lead without mechanical calking and produces a driving fit and pressure contact throughout the whole length of the lead joint; a very important advantage over the ordinary hammered calking, the compression from which penetrates only a very short distance from the surface.

For one 36-inch pipe joint the weight of the lead and fibre core together is only about 10 pounds, while the weight of a standard hammer calked joint of a cast iron pipe of the same diameter is about 70 pounds, and the latter joint requires considerable time and involves expensive work for melting, pouring and hand calking, and does not insure perfect results without testing, repairing and retesting.

The shifting of the derrick from joint to joint by hand took almost as much time as making the joints. so that the crew of six men averaged about 120 feet per day with a maximum of 200 feet, although under ordinary waterworks trench conditions, they should be able to lay and join from 240 to 300 linear feet of 36-inch pipe daily.

The pipe was laid in one section of about 2,500 feet and another of about 3,500 feet, both of which were at the ends connected with the old wooden stave pipe by cast iron elbows. The new pipe was laid parallel and close to the old wooden pipe, necessitating extra time and care to safeguard the latter and avoid permitting the weight of the heavy new pipe to be supported by the wooden pipe.

In order to locate and correct any possible leaks the pipe was put in service before any portion of it had been covered. The water supply for the city of Cumberland was so limited that there was only enough stored for a few hours, when the new pipe was completed, and although it was put under pressure as quickly as possible, no signs of leakage were discovered at any joint by the most careful examination, and no portion of the pipe line required any repairs or modifications.

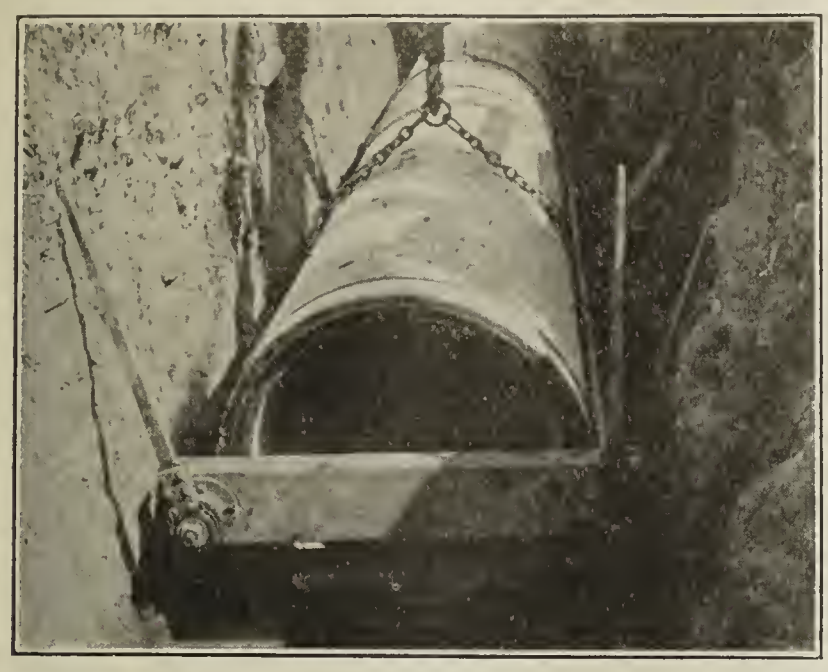
This record is especially notable in that the 500 joints of the line are the first of this type that were ever installed and their condition was so satisfactory that no test other than the service pressure was required for their acceptance by the owners. The flexibility of the joints permitted the entire line to be composed of horizontal curves, vertical curves, and combined horizontal and vertical curves with a maximum radius of 1,500 feet connected by short and infrequent tangents.

The line has been in constant service since September, 1919, without developing any trouble whatever, and has thus demonstrated the integrity of the pipe

and joints under the severe installation conditions and the service pressure of thirty to seventy feet head.

Combined Pressure and Deflection Tests

The efficiency of the joints under severe working conditions was demonstrated by a test made on five lengths of 36-inch pipes jointed together, bulkheaded and put under a pressure of 40 pounds per square inch. The pipe, 60 feet long, was supported at the ends and was jacked up 1½ inches at the center, causing the



Making Pipe Joint in Trench

two middle joints to open 9/16 inch at the top, and the two outer joints to open 9/16 inch at the bottom.

The jack was then lowered 3 inches, reversing the deflection and causing the joint openings to close and corresponding openings to appear on the opposite diameters of the same joints so that the two inner joints were opened 9/16 inch at the bottom and the two outer joints were opened 9/16 inch at the top.

The pipe was then jacked up to its original horizontal position, causing equal expansion of ¼ inch all around at each joint.

All of these movements were accomplished without any leakage in any of the joints of the pipe, thus demonstrating its ability to stand considerable punishment and to take care of any deflection or settlement that it would ordinarily be subjected to in service.—[Public Works.]

Completed Flexible Joint

Corrosion of Metal in Concrete

Assertion has been made that the presence of lime in mortars and concrete materials reduces or prevents the corrosion of metal that may be enclosed. The chemical laboratory of the National Lime Association, Washington, D. C., has undertaken some preliminary tests along this line. Slabs of various cement and mortar materials used in building construction have been made up without lime and with varying quantities of lime, in which metal strips are encased. These are cured for different periods at the end of which time the slabs are broken and the metal examined. The amount of lime used has varied from 0 to 100 per cent.

Wherever no lime was included in the gypsum mixture rusting of the polished metal strips occurred more or less throughout the length of the slab, but where as little as 5 per cent of hydrated lime was added there was absolutely no evidence of rusting of the steel. This is suggestive of the advisability of using lime in gypsum mixtures where they are in contact with metal since this avoidance of rusting is likely to improve the durability of the construction.

Standardized Elevators and Conveyors

The Dodge Sales and Engineering Company of Mishawaka, Indiana, announce the publication of a catalogue on Dodge Standardized Elevators and Conveyors.

The catalogue is standard Dodge size—6 by 9 inches—has ever been issued covering the above subjects and should constitute a text book on the subject which is covered in detail. The complete tables of data incorporated in the catalogue represents an immense amount of work on the part of the Dodge Sales and Engineering Company.

Elevator and conveyor tables used in this catalogue are based on maximum conditions for the different carrying parts, rather than assuming conditions and working out a design for that particular condition.

An interesting feature is the simple manner in which designs involving gearing are worked out, whereby almost any drive whether for a conveyor, elevator or other speed reduction can be picked out of tables; pitches, numbers of teeth. and shaft sizes. All details are thus solved without any complicated calculations.

,The catalogue is standard Dodge size—6 by 9 inches—and is printed on fine enamel stock paper, the whole containing 160 pages and about 150 illustrations.

The catalogue has been in preparation for over a year and a half and no pains or expense has been spared to make it comprehensive in every detail. The catalogue was prepared under the direction of A. O. Gates, M. E.. of the Dodge Sales and Engineering Company, whose method of design of bucket elevators has resulted in greatly improved elevator practice in plants, in all parts of the world.

According to present plans the new catalogue will be ready for distribution on or about December first.

American Concrete Institute Convention

The American Concrete Institute's next convention will be held in Chicago, February 14, 15 and 16, at the Auditorium Hotel. Harvey Whipple, 314 New Telegraph Bldg., Detroit, is secretary.

$1,500,000 Reinforced Concrete Building

The new reinforced concrete building recently completed for McCormick & Co., wholesale grocers, Baltimore, Md., contains 12½ acres of floor space and was built by M. A. Long Co., contractors, Baltimore.

Giant pile drivers, furnished by the Cranford Company, placed 2,875 concrete piles by the simplex method. If put end to end the piles would make a concrete wall 16 inches high and 10 miles long.

Not only does the size of the building command attention, but every modern device for conserving time and labor and for adding to the convenience and comfort of the employes in aiding them to produce the best will be installed.

The girderless form of construction known as the "flat slab" system could not be used on account of the many future holes. The usual beam and girder system reduces the available slab area to such an extent that the location of future holes would have been limited to the space between beams. It was, therefore, necessary to adopt a system having the advantages of the two mentioned systems, namely, shallowness of contruction and strength unimpaired by the cutting of holes. A flat-girder system was adopted with long span slabs from girder to girder reinforced in two directions. This method affords a very shallowness of floor depth, decreasing story heights and giving the maximum area for punching holes between girders without impairing the strength of the structure.

The Concrete Steel Co., New York and Chicago, furnished the reinforcing steel and Havemeyer slab bar-spacer and Hy-chair for supporting head rods over column heads. Symons Clamp Co., Chicago, furnished clamps for concrete column work.

$1,500,000 Concrete Building of McCormick & Co.

View of Interior, Showing Special Flat-Girder, Long-Span Slab Construction to Fit Requirements of Occupancy

Using Bulk Cement on Concrete Road Work

By J. R. Schoonmaker, Contractor, Manwatosa, Wis.

Waste of materials and labor must be eliminated. Cotton, paper and burlap are scarce and high in price. Labor is in great demand and should be conserved to the utmost. Any method of doing work that will conserve materials and reduce labor to a minimum should be adopted.

For years we handled cement in sacks and the labor spent in unloading, untying, emptying, shaking, counting, bundling and shipping sacks seemed a waste of money and effort. I could never see any reason why cement should not be handled the same as sand, pebbles, or stone, but we never tried using cement in bulk on a concrete paving job until this summer when we obtained the contract for paving 21,400 square yards of the Chicago Road in Wilmaukee County with portland cement concrete.

On first thought we felt that additional and costly equipment would be required. A little study of the problem, however, proved to us that we already had all the equipment necessary. Today the problem of handling our cement is no greater than the problem of handling our sand and stone. The method adopted for handling bulk cement does not vary in the least from the methods employed in handling our aggregates except that the cement is either dumped into boxes placed near the mixer or in a hoppered chute hung on the side of the wagon, while our aggregates are dumped directly on the finished subgrade.

We load the cement from car into one of our dump wagons. These wagons are standard equipment except for the side boards, and have a loose bottom with rear drop gate. One man is employed in loading, assisted, however, by the teamsters. Two men will unload a box car of usual capacity in a day of ten hours. The number of teams required of course will depend upon the length of haul and the speed of the paving crew.

Difficulty has always been experienced in keeping men at the task of handling cement in sacks. This trouble has been entirely eliminated since we began using bulk cement, as the job of handling cement has been placed by the workmen on the preferred list.

Cement as delivered on the job is either dumped into boxes by dropping the gate in the bottom of the wagon, or shoveled into a hoppered chute. It is surprising how little cement is lost in bulk handling. As a matter of fact, the losses, as far as we have been concerned, are practically negligible.

Handling the cement from this point on is simply a matter of wheeling in barrows. Of course the barrows must be distinctly marked to indicate the required quantity of cement, but this is the least of our troubles as the amount of cement used checked accurately with the requirements.

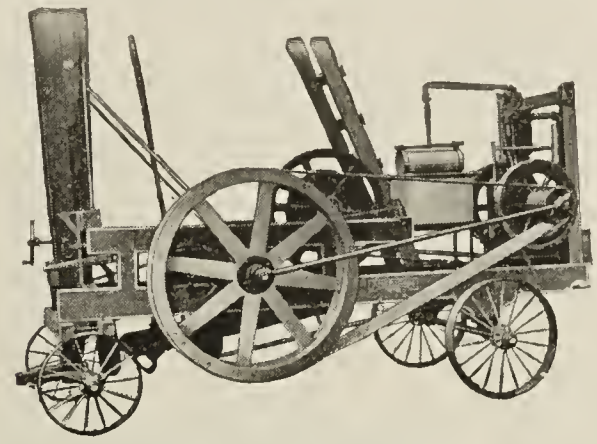
No doubt more economical methods of handling bulk cement for paving have been or will be developed. We expect to simplify our present methods as we proceed. We are, however, greatly satisfied with our first attempt as we undoubtedly are saving a much needed material and doing our bit to ease the supply of labor. Furthermore, the cost of financing our job has been reduced and we have entirely eliminated sack losses and freight charges on returned sacks.

The American Gearless Blast Hole Drilling Machine

Many notable improvements characterize the American Gearless Blast Hole Drill manufactured by the American Well Works, Aurora, Ill. This machine is extremely rapid and substantially built.

While the normal speed of drilling is 50 strokes a minute this machine will jump the tools smoothly at 60 strokes, handling with ease a 4-in. diameter by 20-ft. length drill stem equipped with bit and socket weighing from 1,100 to 1,200 lbs. and drilling 5⅝ or 6-in. holes.

The spudding beam is attached to the crank in such a manner that it gives a quick, hard stroke of drill at



Extremely Rapid, Substantially Built, The AMERICAN Geerless Blast-Hole Drilling Machine. Guaranteed to Drill Through Limestone or Sandstone at 4 to 10 feet per hour.

a speed of 50 or 60 r.p.m., with a minimum of whipping of cable.

No clutches on the machine; the crank is keyed fast to the crank shaft, and the tools are always the full length of the stroke off the bottom when stopping, permitting them to start on the down stroke with engine or motor at full speed without backing up.

Roads of the Future

Dr. C. D. Gray of Pittsburgh, vice president of the Good Roads League paints rather an interesting picture, or makes an interesting prophecy as regards the roads of the future. But in doing so he doesn't reach out so very far into the unknown, or talk so very revolutionary, for there are a lot of people who have had the same idea for some time; in fact, the tendency of the times confirms what the doctor has to say upon the subject.

"Today the man who held out for a twelve foot road," he says, "just wide enough for two vehicles to pass is now crying the loudest for an 18-foot road, and the old fellow who saw economy in a macadam road is now the most enthusiastic for concrete roads and I venture to say that it will not be long before we shall have in every state hundreds of miles of eighteen to twenty-four foot concrete roads. There will be separate roads for trucks and lighter cars and farm produce will find its way to markets by means of motor wheels. These roads will eventually be lighted by electricity."

A road engineer has figured out that twenty billion dollars will be spent in this country during the next decade for road construction. He doesn't attempt to state how it will be spent, for what kind of roads, but he knows what all the rest of us know, the the people of the United States are going to have the best roads of the world some day, for the best roads are the greatest economy.—Columbus, Ohio, Dispatch.

Hauling Aggregates by Motor Truck on Concrete Road Construction

Road construction cost data as generally available is compiled only on the basis of the price of materials and labor, the amounts of material needed, the distance over which they must be transported to the job, and the cost of placing them. Such data is of little value to anyone except to the man who gathered them, for he is the only one who understands the conditions peculiar to that job, the condition of the contractor's plant, repair costs, depreciation and interest on investment, and other information having a direct bearing on the actual cost of building improvement.

Having available only such incomplete data, it is difficult to determine the relative costs of different methods of handling certain features of construction. The difference in organization of the gangs, too, will cause differences in the unit costs of identical improvements under similar conditions. The loose, incomplete cost data generally available make such comparisons a difficult matter.

Given certain definite conditions, as, for instance, the construction of 10 miles of 20-ft. concrete pavement having an average thickness of 8.33 in., it is a simple matter to compute that 46,834 barrels of cement, 13,992 cu. yds. of sand and 20,750 cu. yds. of stone will be required. If, then, the prices of the aggregates are known at the place of delivery, and added to the cost of hauling them to the site where they are to be placed, the total cost of the aggregates is determined. But the cost of hauling is dependent on local conditions, such as the condition of the road, the weather, the equipment used, and other factors.

Trucks Indispensable

In the matter of hauling aggregates to the mixer, the equipment used will have an important bearing on the cost of that item. Concrete road contractors, like contractors on many other classes of work involving transportation of materials, have realized the adaptability of the motor truck for such work, and under favorable conditions the use of trucks for hauling aggregates from gravel and sand pits, quarries or railway delivery points has resulted in substantial savings.

Concrete road-building is not limited to the vicinity of towns and railway sidings, and transporting the aggregates for a contract sometimes as far as ten miles from a shipping point may present a serious problem. Proper hauling equipment on such a job is of vital importance, for the cost of placing the materials at the mixer may be the deciding factor in the success or failure of the contractor. Local aggregate supplies are being used in increasing amount, the materials being hauled from them to the mixer by motor truck.

Concrete road-building has increased to such an extent that the aggregate supply from quarries and pits having railroad shipping facilities is becoming inadequate. With the motor truck as a means of transportation, it has been found practical and economical in many cases to install temporary aggregate plants as near to the job as suitable materials can be found, regardless of railroad facilities.

Good Roads Help

In most cases where the roads are such as to permit the use of motor trucks on concrete road construction, they have effected substantial savings. The cost of loading and unloading aggregates will be much the same for motor trucks as for dump wagons, plant conditions being similar. The condition of the roads over which the aggregates are to be hauled will limit the size of the load and the speed of the truck, and will therefore determine the relative economy of motor truck or team hauling.

On a large number of concrete road jobs going on in various parts of the country this year where motor trucks have been used to transport materials, either special bodies have been built for the trucks or the regular bodies divided into the required number of compartments (three) so that separately measured volumes of cement, sand and coarse aggregate complete for one batch could be dumped into the hopper of the mixer.

A number of examples with cost data will illustrate the advantages of motor truck hauling under various conditions.

R. H. Gumz, paving contractor in Milwaukee, is paying $1.50 per cu. yd. for hauling concrete aggregates 8½ miles from the pit to the job. The trucks haul 5 cu. yds. to the load and usually make six trips a day. The cost of hauling aggregates this distance by team would be prohibitive, amounting to nearly twice that price, even if teams could be secured at $1 an hour.

During the construction of the Beloit-Janesville road in southern Wisconsin, the contractor paid for the delivery of aggregates as follows:

$1.10 per cu. yd. on a 3⅓ to 4½-mile haul;
$1.00 per cu. yd. on a 3 to 3½-mile haul; and
$0.90 per cu. yd. on a 2 to 3-mile haul.

The Atwood-Davis Sand & Gravel Co., from whom the aggregates were bought, delivered them on the trucks hauling 40 cu. yds. per day and one truck hauling 24 cu. yds. per day.

The charges for truck No. 1 were:

Depreciation, 100,000 miles (truck value minus tires)	$ 255.16
Total wages of driver	319.74
Gasoline, 1,377 gals., at 25c	344.25
Lubricating oil, 117 gals., at 56c	65.52
Hard oil, 128.5 lbs., at 6c	7.71
Waste, 20 lbs., at 20c	4.00
Tire depreciation, 5,316 miles, at 3c	159.48
Repairs and renewals	160.00
Total operating charges	$1,315.86
Fixed charges (interest)	288.00
	$1,603.86
Average haul in miles	5.54
Number of yards hauled	1,863.00
Total number yard miles performed, 10321	$0.155 yd. mile
Total number ton miles performed, 15,481	$0.104 ton mile

The charges for Truck No. 2 were:

Depreciation, 100,000 miles (truck value minus tires)	$ 237.40
Total wages of driver	297.00
Gasoline, 1,235 gals., at 25c	308.75
Lubricating oils, 117 gals., at 65c	68.88
Hard oils, 128.5 lbs., at 6c	4.08
Waste, 21.5 lbs., at 20c	4.30
Tire depreciation at 3c per mile	148.38

Repairs and renewals	131.00
Total operating charges	$1,199.79
Fixed charges (interest)	288.70
	$1,487.79
Average haul in miles	5.54
Number of yards hauled	1,780.00
Total number of yard miles performed, 9,861	
	$0.151 yd. mile
Total number of ton miles performed, 14,791	
	$0.101 ton mile

(Above tables show the cost of hauling aggregates on a highway job in Luce County, Michigan, under construction during the summer of 1918. Two five-ton trucks were used. The interest on truck investment was taken at six per cent per year, and no insurance was included.)

The cost of hauling aggregates by motor truck for the construction of a one-course concrete road in Allen County, Indiana, was $0.011 per sq. yd. of pavement. The hauling was done with 3 and 4-ton trucks, the average length of haul being 1.7 miles. The materials were loaded mechanically at a cost of approximately 9 cents per cu. yd., the actual cost of hauling being 42 cents per cu. yd.

A saving of about $1,000 per mile was effected by the length of the haul, there was no apparent injury to the quality of the concrete mixture. As there was excellent stone in the hills adjacent to the road, a location was selected about midway on the contract, a quarry opened and a crushing and mixing plant installed. A 3-ft. strip of concrete, 8 in. thick, was built on each side of the macadam road. The mixed concrete was dumped from the trucks upon the surface of the old road and shoveled into the forms at the side. Forty cu. yds. of concrete were placed per day, the average cost of hauling being $1.76 per cu. yd.

In the work of building highways, as in other work requiring the transportation of large quantities of materials to locations not served by railways, the motor truck has brought a more efficient and economical means of transportation.

Loading and Screening with a Scoop Conveyor

The accompanying illustration shows a novel Scoop Conveyor installation at the sand pit of Somers & Sons, Wyoming, Pa.

Mr. Somers had been experiencing much trouble and

Itasca County, Minnesota, by using motor trucks instead of teams for hauling materials on the construction of the Grand Rapids-Duluth highway in the fall of 1918. Two motor trucks of 5 cu. yd. capacity and three of 3 cu. yd. capacity were used. Figuring in all expenses for operation of trucks, and including depreciation and interest, garage charges, repairs and overhauling on completion of the work, it was found that the cost of hauling was $1.15 per cu. yd., the average hauling being 3 miles. If the hauling had been done by teams, the cost would have been very near to $2 per cu. yd. and the cost of the road would have been increased by $1,000 per mile.

During the construction of the Belair road of the Maryland State Highway Commission, in the spring of 1919, wet concrete was delivered from a central crushing and mixing plant to the road surface by motor truck over hauls ranging from ¼ to 4 miles. Extensive rehandling of materials was thus dispensed with and the cost of the work reduced. In spite of expense in screening his sand and being a resourceful man it occurred to him that an arrangement could be made with his Scoop Conveyor so as to screen at the same time as loading.

The accompanying arrangement ensued. The screen was placed in the truck being supported in the truck by a pole and on the edge of the truck by a small block of wood.

The 24-foot Scoop Conveyor, manufactured by the Portable Machinery Co., Passaic, N. J., was then placed so that the material, when discharged, would fall near the top of the screen. The screen being set at the proper angle the large lumps rolled off out of the truck while the fines fell through.

With this arrangement Mr. Somers is loading and screening 5 tons of sand in 7 minutes. In addition to the money saved on the loading operation the additional revenue obtained by delivering screened sand made this an investment that soon paid for itself.

Conveyor Gets Out Silica Sand

Illinois Company Loads 50 Tons an Hour With Only Four Men to Operate Plant

Opening a silica sand pit always has been a rather tedious and expensive operation. Men, horses, scoops, wheelbarrows, bins for storage, often have been used in order to get the sand from the pit into the cars. The South Ottawa Silica Sand Company, near Ottawa, Ill., is opening up an extensive pit with a drag line and belt conveyor which puts the sand into the cars without immediate storage and extra handling.

Water usually is reached at a depth of about 40 feet, and, from that point on, hydraulic pumps are used to get out the sand. The drag line and conveyor are being used to get out the sand above the water level with a minimum expenditure of time and labor.

The three photographs on this page show how it is done. The equipment consists of a 24-inch conveyor, 95 feet in length, driven by a 15-horsepower tractor, and a 4-ton drag line, operated by a steam engine. A special hopper, designed by Mr. Cebulske, the owner of the works, completes the outfit. When the conveyor was first installed, it was 85 feet long, and since then a 15-foot section has been added. As greater depths are reached, the conveyor can be lengthened again.

In the first photograph, a general view is presented which shows clearly the depth of the pit. The middle photograph shows the bucket at the top of the incline, ready to discharge, with the hopper and the belt empty. In the third photograph, the belt is loaded all of the way from hopper to car, while the bucket has gone back for another load.

With this equipment, four men can load a 50-ton car in an hour. One man fires the boiler and also operates the cable winches. Another tops off the car and pinches it along the track. The other two men are in plain sight in the photographs. They stand at the hopper and keep feeding the material to the belt. Only one man would be needed at this point were it not for the fact that the sand is damp and there are occasional soft lumps which have to be broken up.

Although the conveyor is of a permanent type in that it is not equipped with wheels, it is so mounted that it can be moved on skids in a comparatively short time. This makes it possible to open up the entire pit by shifting the outfit whenever the waterlevel is reached where it is working.

There are about 28 silica sand pits in the neighborhood of the one described, and not one of them is getting out its sand more economically or efficiently than the South Ottawa organization. The sand in this particular part of Illinois is of extremely good quality and is in constant demand by glass factories, foundries, etc. For sheer efficiency and ease of operation, Mr. Cebulske is willing to back his outfit against that of any of his neighbors.

It is simple, does its work well and can be moved easily whenever it finishes work in any one place. These qualities, combined with the saving of labor in these days, when labor is so hard to get, make the outfit just what is needed for the job. Its total cost also is much less than that of the bigger plants with extensive bins for storage, and other apparatus.

Sullivan Drills

Sullivan Rotator drills, manufactured by the Sullivan Machinery Company, are an improved type of hammer machine used for a large variety of rock work, such as block holing, cutting ditches, shaft sinking, drifting, stoping, light tunneling, quarry work, road grading, trench and open ditch work and down-hole drilling.

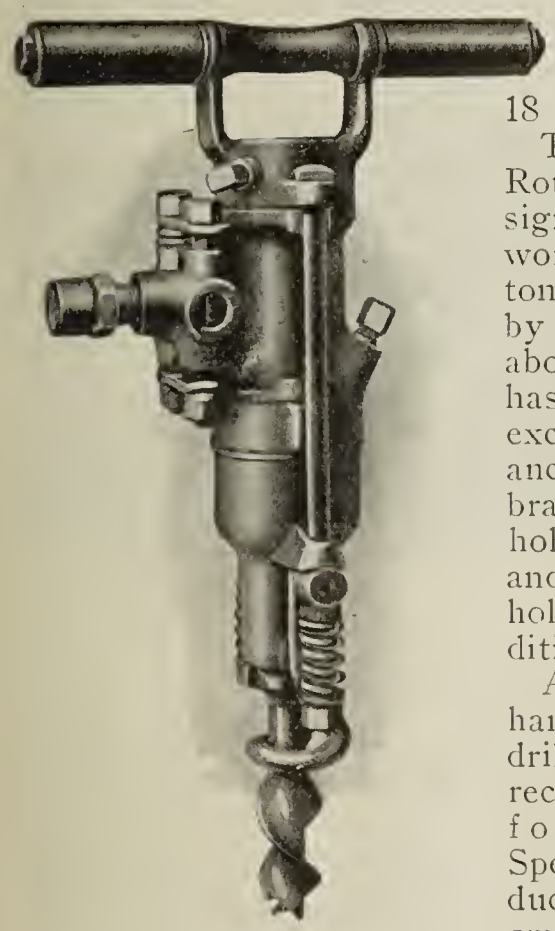
The Rotator is a one-man drill, weighing 29 to 40 pounds, drilling holes from 8 to 12 feet deep for 1¼-inch powder, and may be used as a hand tool or on a mounting.

It is made in seven separate classes, viz., hollow piston Rotator, solid piston Rotator, air tube Rotator, water tube Rotator, steam tube Rotator, auger Rotator and light Rotator, all of which may be used with cradle and feed screw mounting or with pneumatic air feed.

The steam tube Rotator is similar to the air tube drill but uses steam instead of air.

The drills have automatic lubrication, the oil being distributed as a spray over the working parts. The handle is arranged with either a double grip for hand feeding, or with a single grip when mounted.

The new auger Rotator, class DR-37, has been developed for drilling in soft, broken or loose ground where the ordinary compressed-air hammer drill strikes too hard a blow. It weighs 35½ pounds and is only 18 inches long.



D. R.-37. Auger Drill

The new light-weight Rotator, DP-32, is designed especially for work in uhich it is customary to hold the drill by hand, even when above the horizontal. It has a high drilling speed, excellent running balance and very little vibration. It uses ⅞-inch hollow hexagon steel and will drill 4-foot holes under average conditions.

Another new Sullivan hammer drill is the plug drill, DH-3. This is recommended especially for granite drilling. Speed, light weight, reduced vibration and small air consumption and repairs are among the advantages claimed for it. It is 18 inches long, weighs 20 pounds, uses 7-16-inch air hose, is rotated by hand and the holes are cleaned by a blower hose.

The efficiencies of these machines are demonstrated by letters from users, who report some notable records. Repairs were at the rate of $0.015 per lineal foot drilled for Rotators working in hard rock at the Utah Silver-Lead Mines.

One DP-33 water drill on cradle mounting drove 175 feet of 5x7-foot heading in very hard diorite for Sullivan, McQuarrie & Clark, contractors, on the So. Pacific Gold & Copper Co.'s adit, north of Ogden, Utah, without being taken out of the heading during the entire distance and was never taken apart.

At a well-known Arizona copper mine, Rotators have cost $6.53 per quarter year per drill for repairs, based on 67,000 drill days of use. Based on 6,000 drill days during the last quarter, the cost has been $1.28 per drill.

Sullivan Diamond drills for taking test cores have a capacity of 300 to 7,000 feet and are available for operation by hand, horsepower, belt, compressed air, steam, electricity, gasoline or oil engines. They secure cores of 15-16 to 2 inches diameter from any kind of rock formation.

For the preliminary exploration of the site of the dam at Widow's Bar on the Tennessee River, 47 test holes in water 6 to 8 feet deep were drilled to a depth of 18 feet in the solid limestone by a Sullivan Bravo drill operated by a gasoline engine and removing core 15-16 inches in diameter that demonstrated the soundness of the rock.

Minnesota May Build Own Cement Mill

Minnesota will be authorized to build and operate state plants to make cement for road and other public purposes, through the adoption of Good Roads Amendment No. 1.

An opinion to that effect, given recently by C. Louis Weeks, deputy attorney general, is proving an important factor in the good roads campaign and gaining for Amendment No. 1 the solid support of thousands of advocates of state-ownership.

"The talked-of plant has a strong bearing on people's attitude towards Amendment No. 1," said Senator Iver Lee of Glenwood, who asked for the opinion. Senator Lee, it will be remembered, was one of ten members of the last legislature who voted against the bill to submit Amendment No. 1 on the pink ballot Nov. 2.

The attorney general's opinion, which has the effect of law, is briefly as follows:

"In case the so-called Babcock amendment is carried, the state may engage in the manufacture of cement to be used in the construction of roads, and may sell any surplus at not less than cost to the counties, towns and cities.

Commissioner C. M. Babcock of the state highway department was one of the first to express gratification over the ruling.

"More than three months ago a letter from a concern in England brought forcibly to mind the proposal for a state-owned cement mill," he said. "The assistance of the school of mines at the University of Minnesota was secured and a search started for the necessary raw materials, on state lands.

"It was reported then that because of the comparatively small amount of cement needed by the state for road building, and because another constitutional amendment might be required, that the project promised to prove of little importance. Now that the attorney general holds that Good Roads Amendment No. 1 will give the authority, and what is even more important, that the surplus from a good-sized mill or more can be sold at cost to the cities and counties for their road building and other needs.

"It certainly ads another big argument in favor of voting 'yes' for Good Roads Amendment No. 1. While the proposal to hard-surface 200 miles of state roads each year will take only 640,000 barrels of cement, the larger output can be supplied to the cities and counties. Of course, there are certain heavy traffic roads which must be paved, because gravel surfacing means waste of money, and that work will have to be done by the counties if the amendment fails to pass.

New Reinforced Concrete Factory

The most modern automobile factory in the world! That is the way engineers describe the new plant erected for the Cadillac Motor Car Company in Detroit.

The site comprises 46 acres, with the main line of the Michigan Central Railroad on one side, and the freight tracks of the Lake Shore & Michigan Southern on the other.

The eight buildings that comprise this new plant contain 2,100,000 sq. ft., or 48 acres of floor space, room enough for 700,000 people to stand without too much crowding.

All the buildings are four stories in height, but to allow for the inevitable expansion they have been so designed that two stories can be added at any time, making six in all. In the design and construction of this new factory a number of interesting features have been worked out by the DuPont Engineering Company, of Wilmington, Delaware, general contractors for the job.

To the eye all buildings of the plant will be seen as a harmonious combination of exposed concrete columns, horizontal bands and red brick walls framing the vast areas of steel sash.

On the concrete floors will be laid heavy maple flooring to provide comfort for the workmen, who find concrete too unyielding a surface on which to stand all day.

The largest structure of this plant is the Manufacturing Building, 800 ft. long and 600 ft. wide, with a total floor space of 970,000 sq. ft. as at present being built, or 1,750,000 sq. ft. when it is carried to its ultimate height of six stories. The courts between the wings will be covered with glass roofs at the height of the first floor ceiling. This will give an area on the first floor 600 ft. long and 600 ft. wide, or 480,000 sq. ft.

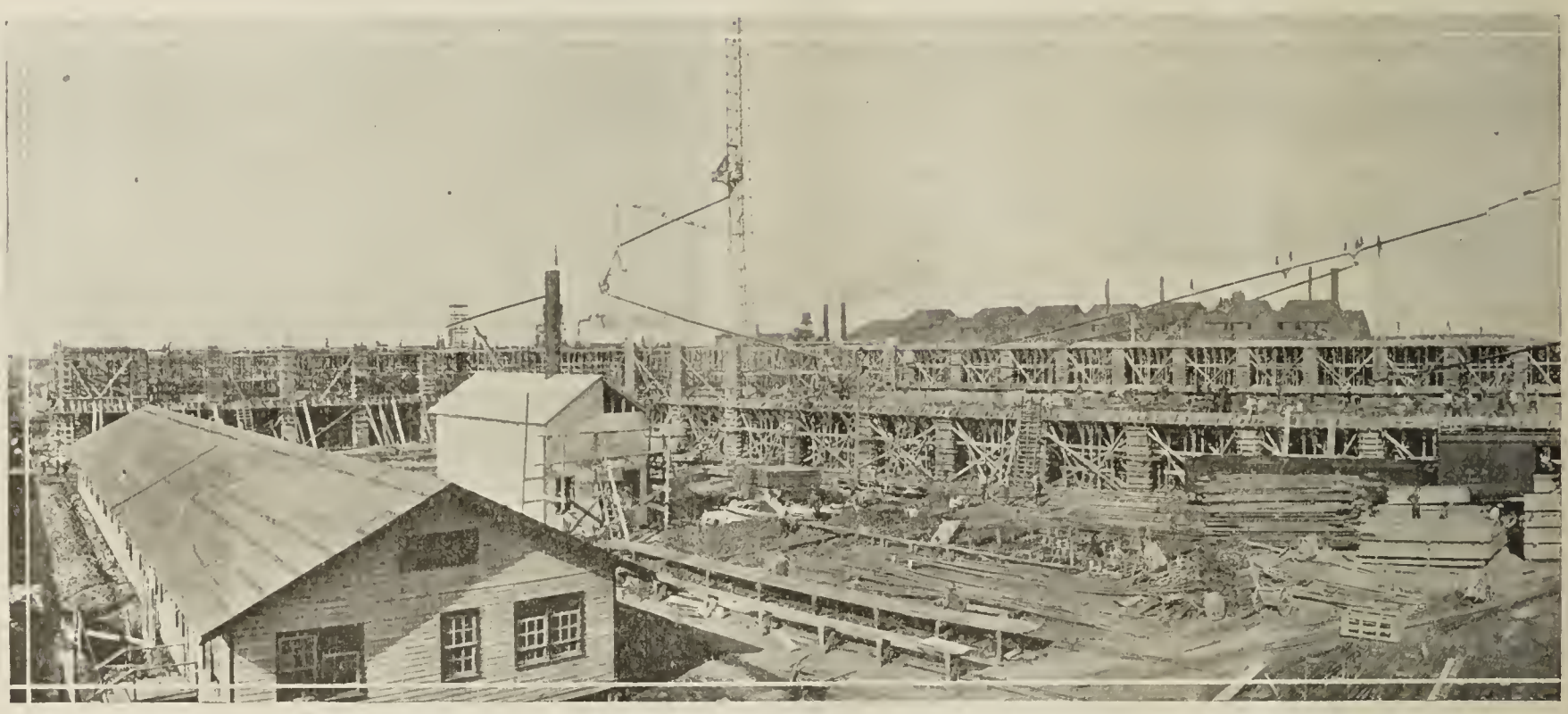
The Assembly Building will be the second largest building in the plant, 800 ft. long and 360 ft. wide, with a total floor area of 620,000 sq. ft. As in the Manufacturing Building, the court will be covered with a glass roof, giving an unbroken area on the ground floor of 188,000 sq. ft.

will be devoted to painting operations on chassis, wheels, bodies and metal parts. The body is upholstered and trimmed up generally in this building, which will also contain the enameling equipment for enameling fenders, hoods, radiator covers and dozens of other metal parts.

The space occupied by the final painting and enameling operations will be supplied with air from which all dirt has been washed so that no stray speck of dust will settle on a freshly painted surface.

The Storage Building for finished cars and service stock parts, adjoining the Assembly Building, will be 480 ft. long and 140 ft. wide. More than half of this building will give storage for 1,000 finished automobiles. The remainder will be devoted to the storage of service stock.

A considerable portion of the Assembly Building



A general view of construction work, taken in October,

Directly adjoining the storage building will be the "loading dock" with trackage for the placing at one time of 50 railroad cars for the delivery of finished Cadillacs.

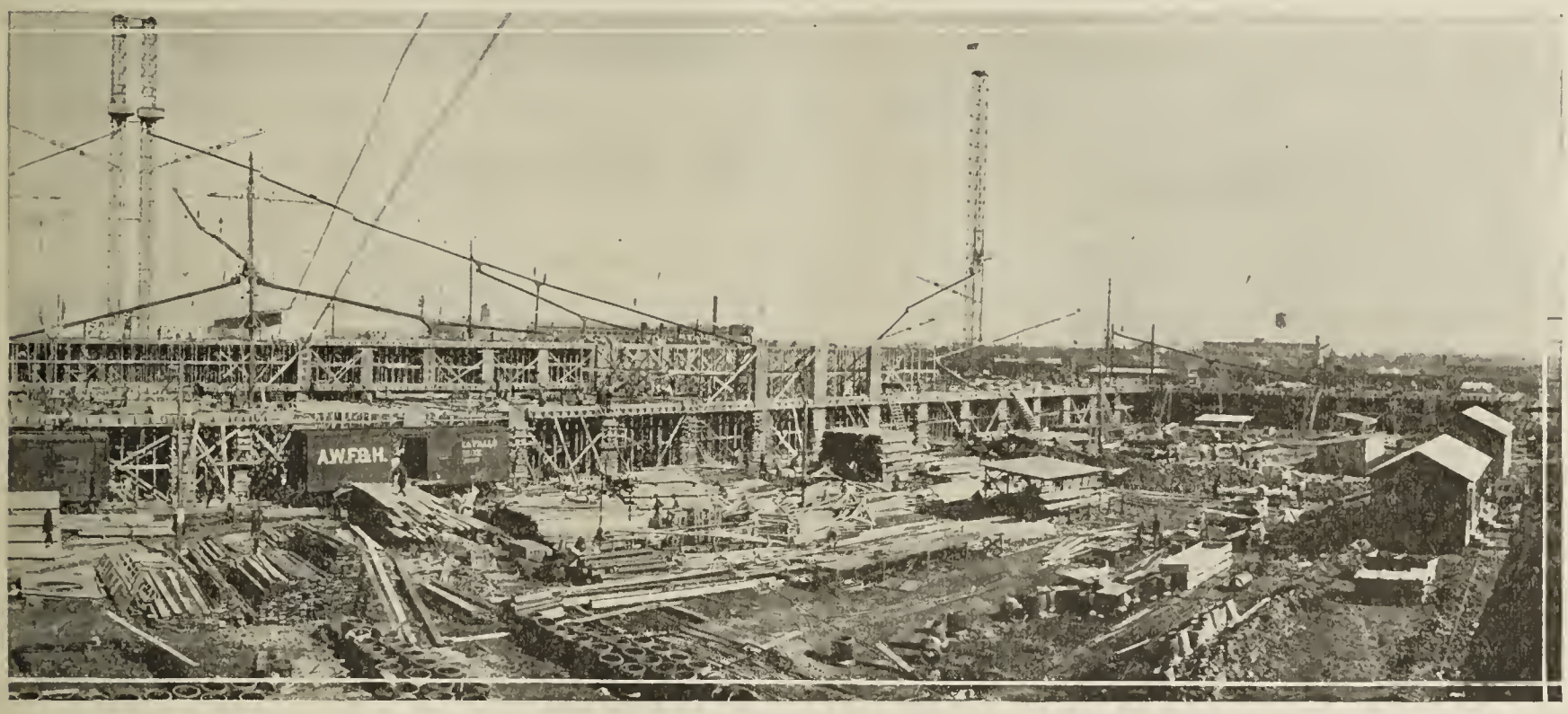
In the Administration Building, 225 ft. long and 50 ft. wide, will be located all the executive offices required for the operation of the factory, and the purchasing, selling and advertising and all other administration activities which are a part of an enormous industry.

In one wing of the Assembly Building will be located a Welfare Department, with first-aid rooms, in which doctors and nurses will be in attendance during all working hours. In general, every provision is being made for the comfort and safety of the 7,000 men who will be required for this factory.

Other buildings making up this plant are: Heat Treatment Building, Power Plant, Oil Storehouse and Scrap Iron Warehouse, each having special features for their particular requirements.

This great construction work necessitates the use of a large quantity of wire rope, and the contractors

used thousands of feet of Leschen Wire Rope on this job. The methods employed to distribute the enormous quantity of concrete involved are well covered by the accompanying illustration.



1919. These buildings occupy a site of forty-six acres

Forms for Moulding Concrete Laundry Trays, Bath Tubs, Sinks, etc.

J. L. Hobbs, 1467 Fourth Street, San Diego, Calif., has filed in the patent office an invention which relates to forms for the use in moulding Laundry Trays, Burial Vaults, Bath Tubs, Sinks and the like, and has for its primary object the provision of a Knock Down Collapsible Core, which when assembled is rigid, but which may be taken from the cast in sections, thereby rendering the withdrawal easier than if it were in one solid core.

The drawing represents the form as being made of material one inch thick, but 12 guage galvanized steel will give far better results and last much longer.

Reinforcements may be put in about two inches from the top and bottom by dropping bent wires into the concrete the shape of the corners.

A very neat top may be made from a sheet of zinc about two inches wide, by bending half an inch of each edge down until the edges are about half an inch apart, it will be necessary to shape this to fit the corners and go entirely round the top of the tray. When this is completed it is placed on the frame 15 after the core has been placed in position and must just fill the space between the core and outside form. When the concrete goes into the hollow space of the zinc and also all around it, it will become a part of the finished tray.

It will be necessary to adopt the former to the size of bath tub, sink and burial vault you wish to make, for burial vaults square corners will probably be more desirable. For double laundry trays the frame will be adapted to hold two single cores, omitting the bolts 16 from the center cross piece.

Fig. 1, is a plan view of the assembled device; Fig. 2, an end elevation of Fig. 1; Fig. 3, an elevation of a section of Fig. 1, taken on the line A-B; Fig. 4, an elevation of the inside of the end section 3; Fig. 5, an end elevation of Fig. 4; Fig. 6, a plan view of the front section; Fig. 7, a plan view of the bottom section; Fig. 8, a plan view of the rear section; Fig. 9, a rear elevation of the foundation frame, mounted on trestles, the legs of the trestles being partly broken away; the assembled core in an inverted position within the outside form, one side of the outside form being removed to show the core. Fig. 10, a plan view of the foundation frame drawn to a reduced scale; Fig. 11, a fragmentary view of the frame 15, and bolts 16, drawn to an enlarged scale, partly in section; and Fig. 12, fragmentary views showing the end and front view of the latch 24.

Although I have shown an adaptation for moulding laundry trays, I do not wish to be understood to limit myself to their particular use, but wish it understood that various adaptations of the invention may be made within the scope of what hereinafter is claimed without departing from the spirit of the invention.

The core comprises a front section 1, and a rear section 2, having pins 12, latches 18, and lugs 20, mounted thereon; two end sections 3, and 4, having lugs 20, and cleats 11, mounted thereon, said cleats being provided with holes 19, adapted to fit over pins 12, and to be held in position by the latches 18; and a bottom section 5, which rests against lugs 20, when the core is in an inverted position shown in Fig. 9. In use the foundation frame, having a series of bolts 16, therein and provided with recesses 26, for the reception of the bent end of said bolts 16, is laid on the trestle 21, and the core placed within said frame in an inverted position, so that the edge rests upon the bolts 16, which are extended within said frame, the bent portion upwards, and made to press snugly against the inside of the core, by tightening the thumb nuts 17. The outside form comprising two end sections 6 and 7, having straight cleats 13, mounted on the outside thereof; said cleats having holes therein adapted to fit over pins 25 on the front and rear sections; and the front section 8, having latches 24 and pins 25, mounted thereon, and a rear section having similar latches and pins. The

contour of the inside of the outside form is similar to that of the core, so that when spaced from the core, a tray having walls of uniform thickness may be cast. The outside form is placed upon the frame 15, within the ridge 23, and the concrete is poured through the opening 9, into the mould thus formed until it is full, when a straight edge is drawn across the bottom and finished.

In 24 hours the core may be removed from the tray without turning it over as follows: After loosening the thumb nuts 17, and giving the bolts 16, a quarter turn, they may be withdrawn into the recesses 26, of the frame 15; the latches 18, are released; an end is removed by grasping the edge which has been resting on the bolts 16, and pulling it away from the wall of the tray when it may be removed from below, the remaining end front, and rear sections may be removed in the same manner, when the bottom is left perfectly free and may be removed, leaving the inside of the tray empty. The outside form is removed by releasing latches 24 and pulling away the end and side sections.

Any further information will be cheerfully furnished by the inventor.

Insulation of Concrete Walls of Buildings*

By Nolan D. Mitchell, Structural Engineer, Supervising Architect's Office U. S. Treasury Department. Washington, D. C.

It is unfortunate that our common fire resisting materials of construction have a high rate of heat conductivity as compared to the more combustible kinds. The cold walls resulting from the use of these has had no small influence in retarding the change from the wooden house to the concrete house. The maintenance of an even temperature in a house resolves itself into the provision of adequate heating apparatus and a construction that will satisfactorily prevent rapid dissipation of heat through floors, walls and ceilings. It is just another phase of the problem that refrigerating engineers have found to be of such importance in their work. namely, insulation.

There is plenty of evidence that many builders realize the necessity of insulation against heat transference, but we are not so sure that an altogether satisfactory solution has been found. Let us look briefly into what has been done.

Wood furring with lath and plaster on the inside was probably the first effort to avoid penetration of dampness and the condensation of moisture on the inside of the wall. The result as far as insulating against the heat los through an 8-inch wall is concerned was an improvement of approximately 15 percent. Where the wall block absorbed dampness from the weather, the result was not so good, for in general any porous material in moist or damp condition transmits heat much more readily.

*From a paper presented at National Conference on Concrete House Construction, Chicago, February 17-19, 1920.

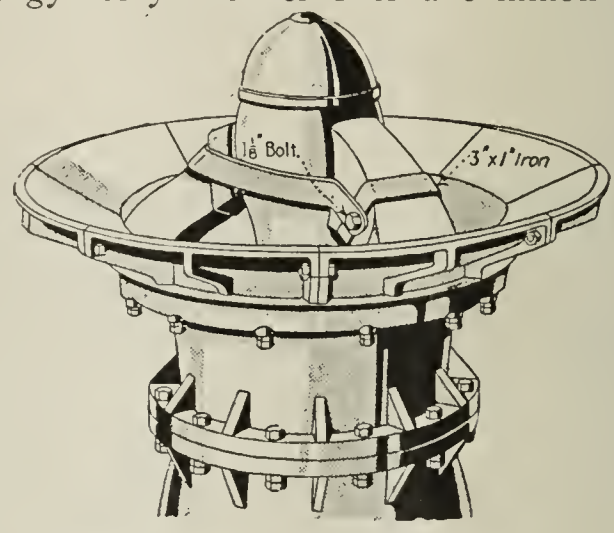
Gyratory Crusher Repairs

By Charles Labbe

Rock breakers are usually designed to stand all the work they are to perform, which is about the hardest service of any equipment in a crushing plant. Wear takes place in the bearings and on the crushing jaws. All bearings are babbitted, and when worn down they must be rebabbitted. Use only the grade of babbitt metal made for that purpose. Many babbitts are either too soft and do not stand the pressure or are too hard and brittle.

In most crushers the crushing jaws can be changed end for end. When worn at one end, which is mostly the lower end, taper bolts must be drawn very tight; and if the jaw plates have a chance to move sidewise it is best to wedge them tight, or, better, pour zinc to keep them in place. If the pitman cap studs break often this is caused by the back toggle being set on the wrong slant. The toggles must point down toward the pitman, and worn toggle and toggle seats must be taken out and overhauled at the machine shop. There must be plenty of head room at the crusher, and a crawl with chain block must be installed even before erecting the crusher. Such an installation will pay for itself at the first repair. Over large crushers it is imperative.

In the gyratory rock crusher a common repair is



Gyratory crusher emergency repair

the babbitting of the eccentric. A special sleeve is always provided, thus simplifying the job. The old babbitt is chiseled or melted off, the sleeve clamped on and the babbitt poured in. As soon as cool, the sleeve is removed and the oil grooves are cut. The concaves must be replaced when worn to a safe limit. To take them out, the first one (which is the hardest) must be shot out with powder by boring a small hole in the zinc. Sometimes, blasting can be avoided if by careful examination a loose concave can be found by trying with the hammer, the zinc chiseled off so as to let drive a sharp moil, and then a crowbar used. To put in new concaves, a guide ring is often used, which facilitates the work. If none is at hand, each concave is braced to the head with a strip of wood. Clay, softened with oil is used (as in general babbitting work) to prevent zinc from running out. Be careful that no foreign matter drops between the concaves, as it will impair the strength of the zinc and make moiling certain when pouring. The concaves will set tighter if they are heated before pouring.

To take up the wear and to keep the crushing uniform, the shaft is raised, but when the lower edge of the crushing head comes above the lower edge of the concaves nothing can be gained. Either the concaves or the head must be changed. To take the head off, it is best to remove the entire shaft to the machine

shop, because, as a rule, it is tight, and often the hydraulic press must be used.

In some crushing plants a duplicate shaft is kept with a different head. The one already used is put in when a new set of concaves is placed, and when the concaves are somewhat worn, the shaft with the new head is put in. Thus, the adjustments for uniform crushing are easy and a head can be changed at the shop when convenient.

A tedious repair is the replacement of a broken shaft; and a broken spider is as bad, if not worse. In this emergency a clamp must be forged in place to fit around one arm near the shaft bushing, another clamp fitted at the lower part of the broken arm, and a strong draw bolt put on each side. But in places where big rocks hit the spider, bolts must be omitted. A piece of flat iron is heated and bent in place around one arm, extending to the lower part of the other arm; then both ends are fastened with a bolt, as shown in the illustration. The heat must be kept on the sides of the clamp while tightening the bolt. In cooling, the contraction brings the broken parts together.

The Dragline That Does 5 Machines Work

The Austin 5 in 1 Dragline is designed to give efficient service in many ways, so as to make the machine a profit maker at all times. A road contractor can use it as a dragline to insure drainage and grade the road, as a skimmer to level and smooth up, as a shovel to make cuts, and later, as a clamshell to unload cars, or as a crane to hoist batch boxes.

The sewer contractor can use a 5 in 1 to dig trenches and backfill them; as a crane to lower big pipes and pull out trench sheeting; with shovel attachment to dig sewer trenches, backfill them, and load into wagons the extra dirt.

Austin Dragline, Equipped with a Page Bucket, Owned by The Coronet Phosphate Company, Plant City, Florida, Now Employed in Building a Railroad Across a Swamp to Their Phosphate Beds.

In irrigation and drainage developments, lateral ditches of small cross section are often located so that the use of large excavators is prohibitive. Ditches as small as four-foot bottoms and varying slopes are economically handled by a 5 in 1 dragline. It is ideal for cleaning out silt or enlarging and deepening old ditches.

In quarries it can be used as clamshell, orange peel, shovel or crane. It can be used profitably in loading or unloading cars or loading wagons with coal, stone, gravel, sand, or any fairly loose material. One good operator can handle from 400 to 600 cubic yards per day, equivalent to 10 to 15 car loads.

There are a multitude of other ways in which a 5 in 1 is used to advantage. One man throws the controls to proceed, back, swing completely around, dig, lift, shunt, drag, skim, hoist, fill or empty. It is the result of years of careful study by engineers of recognized ability. To be a profit maker is to be always working. Idleness invites rust, decay and loss of interest on the original investment. The manufacturers of this machine, the Austin Machinery Corporation, Railway Exchange Bldg., Chicago, will gladly forward you full information by asking for catalog D.L.121.

Transporting Road Building Materials During Fall and Winter and Storing at Point of Consumption Until Spring, Thereby Relieving Transportation Congestion and Facilitating Construction

If we get any further with our attempt to construct highways next year than we did this, we must have more road materials supplied to us than during the season just passing.

During the usual road building season, open top cars are not available in sufficient numbers. The supply this year failed more completely than ever before. It so happens that ore, coal, farm products and building materials have their heaviest movement during the months of June to November. Railroads must at that time handle a peak load.

There would seem to be no reason why more, if not all, road building materials could not be transported during the Fall, Winter and early Spring months and stored at the job. When the season opens we could then start our work and go through the season without facing the expense of shutting down our road plant every other day for want of materials.

At first thought you may think that the interest on the money represented by stored materials would increase costs. The manufacturer's experience is that the economies of steady production will much more than offset this interest item.

In some cases the law makes it possible for the state highway engineer to pay estimates on materials delivered. In other states payment can be made only on finished work. If you are a constractor in one of the states where you can get estimates only on finished work, would it not be possible to organize your work so that your banker would be glad to extend the necessary credit?

Such a proposition, to be a banking proposition, must be done in a way satisfactory to the banker, who will be willing to help get roads built if we show him how he can help. Lakewood Engineering Co. has sent a letter outlining these same suggestions to state and county engineers, to chambers of commerce, to the chief executives of our railroads and to a long list of bankers and business men. Whether we get anywhere or not depends upon our working together to overcome the difficulties with which we are all confronted.

News of the Cement Mills

The La Salle Portland Cement Company plant at La Salle, Ill., has been sold to the Alpha Cement Company, of Easton, Pa., for a consideration of $560,000, as indicated by revenue stamps attached to the deed, filed recently at the court house in Ottawa, Ill.

The Alpha Co., it is understood, will continue with the improvement, operations and enlargement of the plant.

The La Salle Portland was formerly called the German-American Cement Company. Fritz Worm, long identified with the company as its president, is now sojourning in Europe.

The property of the company covered 350 acres, and it is estimated that this will supply raw material for one hundred or possibly one hundred and fifty years.

Work on the switch from the Big Four railroad at Tippecanoe City, Ohio, to the plant of the Atlas Cement Company has been started. Work on the buildings will be started as soon as the track is completed. About 3 years ago this company bought up $100,000 worth of land just east of this place all underlying with cement rock, and it is estimated that it will take 50 years to work up the rock at the rate of 300 barrels a day, which the plant will turn. Tippecanoe City is rejoicing and is expecting quite a business boom, as the Atlas people will bring from two to three hundred families to this place. Their call is out now for 150 laboring men to work.

What is perhaps the largest real estate transaction ever completed in Eaton County, Mich., is the sale of the entire holdings of the Burt Portland Cement Company at Bellevue to the Alpha Portland Cement Company of Easton, Pa., a $25,000,000 New Jersey corporation, the transfer being made October 18, according to the records just filed with the county register of deeds at Charlotte. The former owner of the property was George R. Burt of Battle Creek. The deal was made for a consideration of "$100 and other valuable considerations." United States revenue stamps to the value of $375 were used in making the transfer, which indicates a value of $375,000, but the assessed value of the property is considerably higher than that figure and those in the best position to estimate such matters state that it is worth somewhere between $4,000,000 and $10,000,000. The plant is now working at full capacity, about 200 hands being employed.

Switch tracks and spurs leading from the main line of the C. D. & M. to the new site of the Western States Portland Cement Company's proposed plant at Nutting crossing, near Davenport, Iowa, are being installed preparatory to the starting of actual construction work on the plant, company officials announced today.

J. G. Stancliff, engineer for the company, was in the city today in consultation with H. H. Tunnicliff, engineer in charge of construction work, in regard to progress on the new plant. Mr. Stancliff returned to the company's headquarters at Kansas City.

Work on the new buildings will be started within a week or 10 days, according to present plans. Sufficient trackage to permit the unloading of materials for the structures will be in place by that time, it is said.

The following item was taken from an article in the Omaha Bee of Nov. 21, concerning prices of cement, etc.

"An Omaha man who is heavily interested in a cement plant states that there has been a rise of 70 cents a barrel since last spring, at the mill. He frankly says that although prior to the last five years, cement mills went through trying times, the enormous demand of wartime made much money for the producers. He says that in some instances production has been limited, partly by the car shortage and partly by the excess profits tax.

"This tax, which, like the car shortage, has to bear so much blame, begins to fall heavily when profits go above 20 per cent on the investment. According to the view put forth, really big business men do not consider an investment successful unless it makes at least 20 per cent. After this point is reached the government collects 46 cents out of each $1 of profit. The claim is made that rather than divide their earnings thus, producers are warranted in decreasing their output rather than their prices. A small volume of business and a large margin of profit becomes a commercial maxim.

"A stockholder in one cement plant professes himself not altogether sympathetic with this system. In this case, the company is controlled by a Colorado millionaire, with a string of cement mills. He is said to claim that he has paid $1,000,000 out of his combined profits to Uncle Sam, and to have declared that he did not care if this one plant made another cent, because his taxes would cut increasingly deep. This, of course, leaves out of consideration the other stockholders who have not such wide or profitable investments.

"However improbable it may seem that there can be men who are unwilling to pay out 46 cents in order to make 54 cents profit, this reason is quite frequently given by business men for the limitation of production."

High cost of building will delay temporarily the erection of the cement plant of the Davenport Cement Co. That decision was recently reached at a meeting of the directors of the company. It was made after due consideration of a report from Robert Hunt Co., engineers, of Chicago, which shows that the company site for the mills is considered among the best in the entire United States.

Directors, all of whom were present, believed that building costs would gradually drop within the next few months and for that reason decided to await developments. That a $2,000,000 cement plant is assured, however, is announced as a result of the favorable report on the desirability of the Dodge farm near Buffalo as a location. This farm is the property of Mrs. Helen Dodge and R. B. Cook, who have given an option to the cement company.

At the session recently held it was also decided not to sell any stock at this time. Requests had been made for blocks of $500,000 and $200,000 of the stock. A formal resolution declares that high building costs makes the present time inopportune for construction of the plant.

Present at the meeting were Joe R. Lane, who presided, Charles Shuler, who was secretary, William L. Mueller, E. L. Cox of Chicago, Max E. Ochs and R. B. Cook. They are the only members of the Davenport Cement Co.

James E. Gillespie, Stevens Point, Wis., a former member of the state highway commission and later superintendent of equipment and day labor construction for the commission, has resigned to accept the position of assistant to the president of the Marquette Cement Manufacturing Company in Chicago. Mr. Gillespie graduated from the engineering course of the University of Wisconsin in the class of 1905 and shortly after entered the employ of the state highway commission as division engineer at Wisconsin Rapids. He was promoted to engineer of the Milwaukee division and maintained headquarters in that city until he enlisted in the United States army for service overseas.

International Cement Corporation, New York, N. Y. For the quarter ended Sept. 30 last the surplus after interest, reserve for federal taxes, etc., was $654.101, compared with $547,591 in the second quarter and $225,346 for the first quarter, or a total of $1,427,038 for the first nine months of 1920. These earnings are equivalent to $5.31 per share on the 268,396 shares of capital stock outstanding at the present time.

An appeal to the interstate commerce commission for readjustment of charges paid by cement concerns in the Kansas gas belt when railroads were under federal control, was argued before John T. Money, attorney examiner, in the Hotel Baltimore, Kansas City, Mo., on Dec. 20.

Six companies with plants at Fredonia, Humboldt, Mildred, Independence and Chanute, Kan., and Dewey, Ok., assert the rates charged were excessive and discriminatory, according to the then existing schedule. The petitioners ask settlement under that schedule.

Orders of the local building trades council, San Jose, Calif., prohibiting union workmen from handling cement manufactured by the Mission Cement Company, listed as "unfair," is believed responsible for the acute cement shortage now being experienced in San Jose, says the "Morning Herald," the effect of which is a general cessation of building activities in the county and the idleness of hundreds of workmen.

Events leading to the listing of the Mission Cement Company by the local building trades council as "unfair" began with the construction of the San Juan plant of the company with non-union labor, the plant lying within the jurisdiction of the local building trades council. About a year and a half ago, according to Walter G. Mathewson, secretary, San Jose building trades council, certain overhauling to the plant was required, and the company made application on the San Francisco council to use union labor.

This request was granted, with the understanding that the purely mechanical end of the work would be performed by only union labor. This agreement, according to Mr. Mathewson, the company failed to carry out, with the result that they were again put on the "unfair" list by the local council.

"It was this that brought Mr. McCarthy, a representative of the company, to see me," concluded Mr. Mathewson. "He stated that unless we used the material of his company, he would see that no other companies shipped any in. If this practice is continued, it looks to me like a combination in restraint of trade, and as such should be subject to prosecution under the Cartwright law. If it's not, we want to find it out before the legislature meets so laws can be passed preventing combinations to injure the business of others."

The Phoenix Portland Cement Co., Nazareth, Pa., is constructing at its Nazareth, Pa., plant a large transformer house to take care of additional power, which will be required to operate the large compartment type mills, which are now being installed in their cement grinding department. Last year this company redesigned and reconstructed their entire raw grinding department and coal mill, which has proven very efficient in every respect, decreasing the amount of labor required to operate their plant. Last January a locomotive crane was installed to unload and handle the coal to the coal mill. Upon the performance of this crane another locomotive type crane electrically operated has recently been placed in operation. It is one of the largest cranes in use at any plant in the Lehigh Valley, being operated on a 16-foot gauge track and having a boom of 85-foot swing, with three-yard clamshell bucket which will be used in the handling and storage of crushed cement rock. All improvements at this plant were designed and erected under the personal direction of Howard H. Leh, the company's general superintendent. [Rock Products.]

The Lehigh Portland Cement Co., Iola, Kansas, just recently completed some storage bins for the finished product of the plant and the great concrete cylinders look like a terminal elevator for grain storage.

The Superior Portland Cement Company's plant, at Concrete, Wash., has maintained its production at capacity during the year, and installations are to be made that will increase the crushing facilities at the quarry and reduce the costs of crushing. In the meantime a concrete building for clinker storage is being provided. Those improvements all lead to an increase in plant capacity.

"Did you ever stop to consider," writes the Lansing Electric Engineering Company, Lansing, Mich., "that we have spent years of our time on your electrical problems? Years of untiring efforts which embraced university training, laboratory tests on material, plant analysis, etc? We offer you today the services of men from our organization who can carry your problems through to a successful issue, can meet your emergency just the same as we met others.

We are specialists in Motor Designing, Motor Building, Coil Building and Power Surveys. The knowledge we have gleaned after making a thorough study of cement mill plants and their operation, the experience we have gained through making the cement industry our choice of operations and our factory facilities, we offer you now. We know we can be of aid to you and we also know you have your electrical problems to solve.

"An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States."

J. E. Middleton, assistant plant manager of the Atlas Portland Cement Co., at Hannibal, Mo., has resigned his position and with his brother, W. S. Middleton, has bought a large brick manufacturing plant at Canton, Ill. Mr. Middleton entered the service of the Atlas 17 years ago as a stenographer and has been advanced through various positions to that of assistant plant manager.

The Sandusky Portland Cement Co.'s plant at Sandusky, Ohio, closed for the winter. Repair work will be started soon.

The Empire Cement & Limestone Co., Wade H.

Davis, president, Healy Bldg., Atlanta, Ga., are enlarging and overhauling its cement plant at Portland, Ga., preparing to go back into the manufacture of Portland cement at an early date.

A part of the plant has been utilized continuously in the manufacture of agricultural limestone. This makes it possible to keep the organization alive and make many improvements in the crushing plant.

This company has practically all of the equipment for a 1,500 barrel plant, excepting one kiln, and with the installation of an additional kiln, 8½x125 ft. the same size as the one they now have—would equip the plant to produce 1,500 barrels a day. It is understood that negotiations are under way that will provide the necessary capital to put this excellent property into operation very soon, with a considerably increased capacity.

Definite announcement has been made that ground will probably be broken before the end of this year for the new 1,000,000 barrel per year Portland cement plant of the Lehigh Portland Cement Co. at Birmingham, Ala. Engineers have virtually completed their work and actual construction of the plant will start when forces are released that are now engaged in construction work for the company at other points. These will be transferred to Birmingham. It is also announced by officials of the company that it is hoped to have a part of the plant in operation this year, or at least early in 1921.

The site obtained by the Lehigh Portland Cement Co. includes 250 acres of rich limestone quarry land near what is known as Tarrant City on the outskirts of Birmingham. This will afford raw material in large quantities and of excellent quality. The site alone cost the company about $200,000, it is reported. The plant is to cost about $3,000,000.

The coming of the Lehigh company to Birmingham makes this city one of the country's important centers in the manufacture of cement. During the spring of 1920 the Atlas Cement Co. took over the plant of the Standard Portland Cement Co. at Leeds, near Birmingham, and has been operating it at full force since that time. The National Cement Co. recently took over the long idle plant of the Coosa Portland Cement Co. at Ragland, overhauled it and added improvements, and is now operating it at an annual capacity of 750,000 barrels.

What they are really doing in the plant of the Burt Portland Cement Co., Bellevue, Mich., is to age the clinker instead of the cement, as is done in many plants. Water is sprayed on the hot clinker at the elevator before it goes into the storage bins.

This has more than one point of advantage. In the first place, by very careful regulation, the correct amount of water is added to the clinker to bring about that peculiar chemical reaction, known generally as aging. Ordinarily this action takes place in the cement itself, through absorption of a certain amount of water from the atmosphere. This requires greater cement storage capacity to insure that all the cement be properly aged regardless of fluctuation of demand.

By wetting the clinker the aging is done almost in a moment, and the cement produced is ready at any time for shipment.

The wetting has another advantage, in that it breaks up the clinker as it comes from the kilns and so saves considerable grinding. As the water strikes the hot clinker there are numberless tiny explosions and the pieces are shivered into fine particles. From the clinker storage, 25 per cent of fines are screened out and passed around the ball mills direct to the tube mills, which is a saving directly resulting from the breaking up of the clinker by water.

The water used for this purpose is all measured by a meter which is read several times a day. A record is kept of these readings so that the exact amount of water per kiln-hour can be ascertained. This quantity is kept as uniform as possible and just sufficient to age the clinker without getting it wet enough to interfere with the grinding.

Inter-State Portland Cement Co., Des Moines, Ia., has been incorporated with a capital of $3,100,000. The officers are: President, Parley Sheldon, Ames, Ia.; vice-presidents, L. K. Nickols and W. B. Barney; secretary-treasurer, Paul W. Carroll; general counsel, George Cosson; chairman of the board, B. F. Carroll.

For several years the cement manufacturers have charged uniform prices. Manufacturers in Allentown, Pa., and Hannibal, Mo., have sold cement to Indianapolis dealers at the identical price at which the same dealers have bought cement from mills in Greencastle, Ind., Speed, Ind., and Mitchell, Ind. Considerable variation in the freight rates between the different cities does not affect the price to the dealer.

Although increases in prices on the part of the manufacturers never were made on the same day, the prices again became uniform within three to five days after one manufacturer sent out a revised price list showing an increase.

"The lists have often looked as though they were printed on the same day, although we never have received them in the mail on the same day," one leading dealer of Indianapolis said when asked concerning the uniformity in prices. There rarely is any variation in the prices as quoted at the mills, and whenever there has been, it has existed only two or three days.

The fact that a uniform price is charged by the manufacturers has compelled the dealers to sell at uniform prices. There has been some slight variation in prices, however, when dealers are competing for an unusually large order. [Indianapolis News.]

Clinker from the kilns in the plant of the Wolverine Portland Cement Co., Coldwater, Mich., is discharged onto a pan conveyor, which delivers it to a set of crusher rolls, before entering which a jet of water is sprinkled over the clinker. After passing through the crusher rolls, the clinker is elevated and delivered to storage, which has a capacity of 30,000 bbls.

In the clinker storage room there is a Jeffrey pan conveyor with top and bottom run, the bottom run passing through beneath the clinker storage. The clinker first put into storage therefore is drawn out first so that at all times it is possible to use seasoned clinker.

Clinker is delivered from the Jeffrey conveyor to automatic weighing machines where the proper amount of gypsum is added. This machine is automatic in its operation, adding the requisite amount of gypsum to each hundredweight of clinker. From this point the clinker is carried to a Sturtevant mill bin. A duplex ring-roll Sturtevant and three 30-in. Griffin mills are used in the preliminary preparation of the clinker. The output of these machines is elevated and delivered to the tube mill bins, from whence it is fed into two 5-ft. 6-in. by 22-ft. Allis Chalmers tube mills.

The finished product is then delivered to belt conveyor, which carries it to the stock house and Bates packing machines, where it is packed for shipment or for storage.

News of the Concrete Products Factories

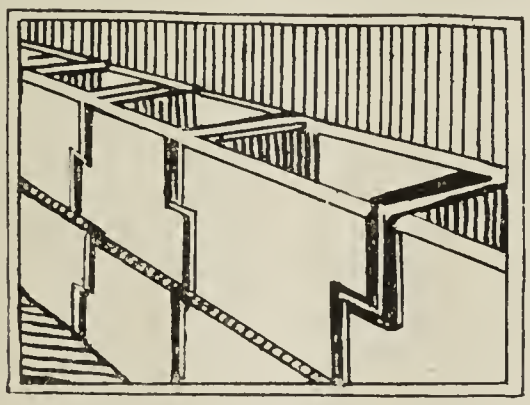
The Badger Concrete Co., Chris Olsen, proprietor, Oshkosh, Wis., is erecting a new building of concrete blocks with granite surface and will be two stories in front and one in the back. It will be equipped with the latest improved machinery for the manufacture of building blocks, ornamental trim and burial vaults and will have space for curing the cement products. The following machines will be used: Anchor and Wert block, Automatic Sealing Vault burial vault molds, Little Giant brick, Anchor tamper and Oshkosh and Waterloo mixers. Crown Point Spar Co.'s micaspar crystals used for facing.

The Cement Products Co., Medford, Minn., are building an addition to their factory to take care of their rapidly growing business.

A. G. Raisch, Modesto, Calif., has established a plant for the manufacture of Sawyer System pre-cast unit concrete construction. Mr. Raisch has the exclusive right to manufacture this patented system of concrete walls throughout the San Joaquin Valley and he is at present furnishing the material for the walls of the new Modesto Winter Garden auditorium, and among other buildings is a new milk depot for C. L. Morse. In this building an icebox was constructed out of this material, the hollow space in the wall being filled with mill shavings for additional insulation.

Mr. Raisch describes the Sawyer System as follows:

"By means of concrete slabs and concrete keys a rectangular block is made which when set in place, makes a hollow wall. The slabs and keys are molded in a battery of molds at the plant. Each piece of material comes out a homogeneous and non-absorbing product.



"When placed in a wall the first procedure is to place a firm foundation and after the foundation has set sufficiently, the concrete slabs and keys are set in place. No mortar is used in between the courses, and the only concrete used while the construction is going up, is the concrete needed to fill the space between the keys which forms the pilasters or studs. Each pilaster or stud can be re-enforced with one or more steel rods. These studs are set sixteen inches (16) on center.

"When the wall has reached the required height, the cement cap is set in place, also reinforced with steel rods, which are tied into the steel that projects through the studs. At the corners of the structure a solid corner is poured of concrete which is reinforced with steel rods, and these rods carry each way from the corner into the cement caps, which steel, finishes the tying of the entire structure.

"The frame of the building thus erected consists of a reinforced concrete frame work, supporting the interlocking slabs and keys. It is an elastic structure, easy to take up the shocks and transmit them to the foundation without causing a break in any part of the structure.

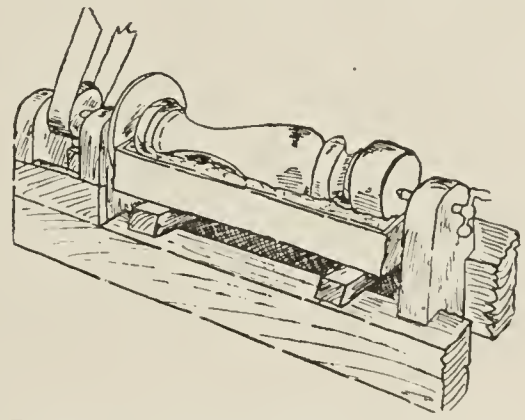
"In the hollow wall of this construction there results a structure that is cool in summer and warm in the winter, absolutely fire-proof and damp-proof.

"It is possible to put on any kind of cement or plaster finish desired, and it is not necessary to strip or furr the wall, but simply to plaster directly on the sides of the concrete slabs.

"While the 'Sawyer System' is comparatively new, it has been thoroughly tested and found to be the cheapest and best fire-proofing building material on the market, combining the advantages of a hollow wall with that of reinforced concrete."

The McKenzie Vitrified Concrete Products Co., Mabton, Wash., has completed a plant for the manufacture by a new patented process of sewer pipe which is claimed to be acid proof and waterproof and twice as strong as any other sewer pipe made. The company claims to vitrify any concrete product that can be put on cars and run in a kiln, and can produce the finished product in twenty-four hours by the patent process. The product is cured by steam heat.

There is an interesting piece of equipment in the products plant of Schaeffer Bros., Rochester, N. Y. One particular advantage of the equipment is that it can be started going and then left to get along very well by itself. Actually it is nothing but a wood lathe, but the way the lathe principle is applied in this case to concrete products manufacture is just a little unusual. It is used on round objects, objects which have no intricate projecting detail, such as round balusters, simple types of vases, etc. These are tightened in the lathe on their central axes and are made to revolve in a shallow box of sand placed underneath. A piece of bagging is stretched over the lathe and over the piece of work which is being finished so that the sand does not fly but is all returned to the box. This gives a splendid sand-rubbed finish on many classes of work and at a very small expense.



ROUND PRODUCTS FINISHED ON LATHE, BY REVOLVING IN SAND

Don't shut down your plant this winter. Winter is the busy time for the progressive concrete vault maker. In fact, the products maker who goes into the vault business in earnest usually makes more money out of it than he does from all his other products put together, writes the Automatic Sealing Vault Co., 216 E. River street, Peru, Ind., who will help you sell the vaults.

Treichler Bros., building material dealers, Afton, Iowa, purchased steel moulds in July and started to manufacture poured concrete brick. They write:

"We are more than pleased with our moulds, having made and sold over two hundred thirty-five thousand brick up to this time and have another pretty good prospect in view.

"As to the time required to empty, pile, grease, re-set and fill with cement, we have found that two men will handle the one-hundred seventy-five forms in four hours, making 1,225 brick, some may do this a little quicker but we feel this would be a good basis to work on.

"We had occasion to put on a fire test in competition with hard burnt clay brick, by setting one each of the cement and clay brick side by side in a blacksmith's forge and when at a white heat they were taken out and dropped in a tub of cold water, and we must say that our cement brick came out with flying colors and is a good brick today, while the clay brick tumbled to pieces.

"In conclusion will say we made a nice profit on all sales which is far ahead of selling clay brick on a small margin."

To dodge trouble in securing aggregates and water and to see that his silo gang is well fed, C. K. Poindexter, Marcellus, Ky., goes from job to job with an equipment that is unusually complete.

His train consists of a 6-horsepower gasoline engine on trucks, a 7″ x 12″ stone crusher, a tank wagon, a mixer and a cook wagon. He carries a complete inside and outside scaffold made in sections of handy size ready to be bolted up quickly. His silo forms are of home made units.

The construction of the forms is illustrated. They are panels of the desired radius constructed by making a wood frame 30¼″ square and covering it with 30″ galvanized steel. The steel is thus ⅛″ from the edge of the form all around. The wood frames are very carefully made of 3″ x 1½″ stock and are held together when in use by 4″ cabinet clamps—two to each section. Four sets or rings of forms are used, making a height of 10 feet. With this number they can be removed as fast as filled and, once started, work is very rapid.

Mr. Poindexter has these forms for 6′, 11′ 6″, 14′, 16′ and 18′ diameters and uses them for many cisterns, water tanks, etc., as well as for silos. He has about 400 clamps, mostly 4″, with a few 5″ clamps to allow for closing with filler strips when needed.

Concrete products are sold, not bought. If you are not a salesman yourself, hire one.

The Better Brick Co., J. S. Symons, president and manager, Scottdale, Pa., have had in operation since early in 1920 a factory for the manufacture of concrete brick. Granulated slag is used for the coarse aggregate. The size of the brick is 2¼x4x8 inches, and weighs less than clay brick of the same size. Bricks are supplied in natural concrete color and also in buff and red shades. The plant operates one Besser brick machine with a capacity of 25,000 per day and a building tile machine of the McIntyre type which makes approximately 2,000 of the 5 inch by 12 inch tile per day. Two additional brick machines are now in transit which when installed will increase the capacity to 75,000 per day.

D. B., care Cement & Engineering News, 22 Quincy St., Chicago, has a "For Sale" advertisement in this issue as follows: For Sale, controlling interest in modern cement brick plant operating in centrally located progressive midwestern city with unlimited supply of raw materials. Capital invested $125,000. Daily capacity 30,000 bricks. Trade established and will make money for right party. Best reasons for selling.

The Detroit Concrete Company, Detroit, Minnesota, are making some very elaborate and permanent improvements at their factory, having torn down all the old wooden buildings and erected in their stead permanent buildings of concrete blocks. The company was forced to do this because of their ever increasing patronage, and their desire to improve their equipment and thus turn out a more satisfactory product. They operate Schenk and Ferguson drain tile machines, International block machine, Helm brick machine, Caldwell and Miller silo molds, Northwestern sewer pipe mold and Standard mixer. Are interested in machines for making building blocks, building tile, culverts and fence posts.

Independent Concrete Pipe Company, Indianapolis, Ind., have just issued a new Bulletin No. 9, 6 x 9 inches, 60 pages, illustrated. Description of pipes of standard diameter 24 to 90 inches for sewers, conduits, drainage, culverts and irrigation work, the pipes being cast at site according to design and with equipment and superintendent furnished by the pipe company. Half-tones of manufacture and installation of pipe and of pipe designs and of detail drawings.

Zanesville Cement Products Co., Zanesville, Ohio, has been incorporated with a capital of $120,000 by S. A. Anderson and R. W. Mercer.

The Dakota Concrete Stone Co., 918 N. Weber avenue, Sioux Falls, S. D., will build a factory for manufacturing road culverts and drain tile.

February 22, 23, 24, 25—To concrete products men of the Northwest these dates stand out as the most important of the coming prosperous year of 1921. The Second Annual Convention and Show of the Minnesota Concrete Products Association, Albert Enblom, secretary, 404 Commerce Building, St. Paul, Minn., will be held at the St. Paul Auditorium and to make this show the biggest and best of its kind ever presented the committees in charge are rapidly working out the most extensive program ever attempted to bring concrete products men together for a discussion of their business problems and at the same time bring together the manufacturers of machinery with which quality concrete products can be made.

The Concrete Products Co., A. G. Meixner, president, 1429 Twenty-second St., Milwaukee, Wis., has been incorporated for $50,000 and are building a new plant. W. E. Dunn Mfg. Co., furnished them with drain tile and cement block machines, also a concrete mixer. Wants prices and samples of facing materials such as white sand, crushed marble, mica spar, etc.

With the exception of a few moulds, the new factory of the Zeidler Concrete Pipe Company in Joplin, Mo., is ready to commence operations. Several carloads of machinery have been installed and the concern will start in on the city contract for $60,000 worth of concrete sewer pipe.

When this contract is completed, the company will continue production and will have a permenent plant.

The Wilson Concrete Products Co., 54 Lock street, Lockport, N. Y., are operating a Besser automatic power concrete brick machine and report entire satisfaction therewith. The materials are mixed, elevated,

fed into molds and tamped without the interposition of hand labor. The machine is started by a lever operated disc clutch after which the machine functions continuously as long as desired. A 10 h. p. motor runs the machine, which makes the standard 2¼x8x3¼ brick but any other preferred size can be readily made.

Three to four men are used in connection with the machine operation; one man supplies the mixer with material; one man feeds the pallets to the machine; one man carries away products; one man piles the product in the kiln and removes same therefrom. By the use of this automatic power machine the Wilson company are enjoying quantity production; quality of product and low labor requirements. Other plants manufacturing concrete brick in large quantities are the Roquemore Cast Stone Co., 2851 Delaware avenue, Buffalo, N. Y.; Geo. Ehrgott, Bethlehem, Pa., and the Fellaboum Concrete Products Co., Toledo, Ohio.

The Zanesville Cement Products Co., 67 Schultz bldg., Zanesville, O., recently organized, capital stock $120,000, advises us they are installing Dunn mixer, sewer pipe and silo molds, block machine and drain tile machine, Anchor tamper and block machine and a Helm brick machine. Are interested in molds for making fence posts and chimney blocks, also waterproofing compound and facing materials such as marble chips, mica spar crystals and white sand.

The shortage of cement has caused two concrete product manufacturers in Sac City, Ia. to lay off about 35 men and work will not be resumed at one of them until about March 1.

Chris Nelson, who recently purchased the interest of his brother in the Cement Block & Silo Company and is now sole proprietor of that establishment, states that most of the men at his plant were laid off early in August and the men engaged in construction work were allowed to go a week ago. Because of the shortage of cement and the cost of coal and labor the plant will not reopen until spring. Mr. Nelson is a stockholder in the newly organized Pyramid Portland Cement Company of Des Moines and he believes that the cement situation will improve within the next two months. He expects to have a contract with the Pyramid company in the future which will avoid a recurrence of the cement troubles of the past season.

At the Cement Products Company plant in Sac City, Ia., only six men are now at work although about 30 are ordinarily engaged there. The plant has been operating only about one-third of the time this summer. Manager W. J. Black anticipates relief in the cement situation with the coming of cold weather, when paving work and other building will be stopped. The plant ordinarily uses two carloads of cement a week and this summer if that many arrived in a month it was deemed good luck. At their Spencer, Ia. plant, only six cars were received since July. Their Mason City plant has continued to operate by hauling cement from the Northwestern States Cement factory in trucks. Besides suffering from a shortage of cement, the plants are further handicapped because of shipping conditions. The Sac City plant has contracts on hand which will keep it busy for two years when work is resumed.

Anchor Concrete Machinery Co., Rock Rapids, Ia., is distributing a large and fully illustrated catalog on the Hobbs concrete block machine. The Hobbs is "a face down,, wet process block machine. It is either a regular 16, 18, 20 or 24-in. machine, as desired. Changing from one size to another is made in a few minutes. Each height of block can be made in any length from 3 to 24 ins. advancing by inches and each height can be made in any thickness of block from 3 to 12 ins. Small oval cores form arches which prevent the concrete from sagging permitting the use of a very wet mixture. Composition face and end plates for making rock faced block are such faithful copies of natural stones, pleasingly chipped, that the sharp edges, the grain and rift of the stone are accurately duplicated. Either iron or wood pallets can be used on the Hobbs. The range of styles and sizes, 2,000 distinct sizes of any one style can be made, enables the operator of a Hobbs machine to avoid monotony. The Hobbs has been so designed that attachments for special sizes and shapes can be attached quickly and easily. Broken or random ashlar, as made by this machine, presents a most pleasing appearance and costs no more to produce than plain block. Catalog may be obtained upon request made to the company.

A plant for the manufacture of cement caskets will be constructed by the Universal Cement Casket Company, Buffalo, N. Y.

B. J. Lamber, department of structural engineering, State University of Iowa, Iowa City, Iowa, is interested in molds for casting balls of concrete from 14 to 18 inches in diameter.

The stationary Kent Continuous Mixer is designed and built for the purpose of saving labor and money for cement products manufacturers.

It saves labor because it performs by itself these separate functions—measuring, dry mixing, wetting, wet mixing, discharging.

It saves money because it shortens your payroll and because it operates "continuously" thereby greatly increasing the daily output of a cement block machine.

The length of life of a Kent machine probably is twenty years. The Kent Machine Co., Kent, Ohio, have been in business over 15 years and machines sold the first year are still in good working order.

All parts for Kent machines are made in their own plant—their own foundry makes all castings; and their expert mechanics do the machining and finishing.

Send for their new catalogue No. 8, describing all sizes, models, parts and showing Kent equipped plants now in successful operation.

H. D. Conkey & Co., Mendota, Ill., have placed upon the market new and very efficient cement tile and block car in single, double and triple deck types, with rigid or folding decks. The Conco cars are strong, easy running, easy to load and moderate in price.

Shoup & Jones, Lincoln, Illinois, manufacture building blocks, porch pier blocks, columns, lattice work, lintels and sills, flower vases birds' bathing basins, well covers, roofing tile, fence posts, water troughs, grave markers, drain tile, and almost anything which can be made of concrete.

Joseph A. Trombley, Saginaw, Michigan, has erected in memory of his daughter, in St. Andrew's cemetery, a monument fourteen feet high with base of White Portland Cement and figure of Bedford limestone.

The base is five and one-half feet high, five feet square, and one panel is a marble slab for the inscription. The base was made in the fall of 1911, and today is without a check and is as hard as flint.

All the work was done by Mr. Trombley.

Ramloe Stone Co., Inc., Albany, N. Y., recently organized, capital $50,000, advise us they have purchased a concrete building tile machine from the Federal Machine Products Co., of Cleveland, O.

The L. I. Cement Products Co., Ltd., Prospect and Pacific Sts., Jamaica, N. Y., recently organized, Thos. Gerus, president; J. S. Linehan, secretary and treasurer, are just starting and expect to be producing block this month. They have a "Special" block machine and a mixer purchased of E. George & Co., Inc., Are interested in facing materials such as white sand, marble chips, lift trucks, block cars, waterproofing compound and the latest and best machines for making roofing tile, building blocks, building tile, porches, fence posts and flower boxes. They write as follows:

"We are making a block with a one inch web only, 8x8x12 and various sizes from 4 inches up. Our forms are steam heated and blocks are turned out in 5 to 8 minutes for curing room (steam with sprinklers). We are using 1 to 3 mixture with about one-half part broken stone, 10 per cent hydrated lime and about 1 pound bicarbonate of soda to the batch. We find the corners more or less breakable and do not seem to set the required strength in our block. Machines are heated about 120 degrees. We have not yet started production, only in the experimental stage. Can you suggest a mix that will fill our requirements, also inform us where we can obtain sprinklers producing steam fine enough not to wash away blocks in curing rooms. We will appreciate any help you may give us."

Wapakoneta Cement Block Co., Wapakoneta, Ohio, is erecting a new factory building around the old structure and will occupy it in several weeks. When the building is completed, the old one will be torn out. Work is continuing without interruption.

The Elmore Cement and Tile Co., Elmore, Minn., has secured a contract for the furnishing of $73,000 worth of tile for a drainage ditch to be put in soon in the northeast part of Jackson county.

The Franklin Cement Block & Supply Co., Theodore Hindenlang, legal agent, Newark, N. J., has been incorporated with a capital stock of $50,000.

The Newcomer-Breeden Construction & Silo Co., A. C. Newcomer, president, Marshalltown, Ia., has been incorporated for $50,000 to manufacture concrete stave silos, concrete blocks, corn cribs, granaries, etc. They are now erecting a new factory building and are installing a Waterloo Perfection Tamper block machine, New Monarch Machine & Stamping Co.'s stave silo machines and a Blystone mixer. Mr. C. F. Breeden, vice president of this company, also operates a modern concrete products factory at Newburg, Iowa. Mr. Breeden has recently erected a number of cement stave granaries for the farmers in his vicinity. These combination corn cribs and granaries provide safe and economical storage of grain on the farm until market conditions are right.

McPheeters & Wood, concrete products manufacturers at Terre Haute, Ind., have discarded the track and car system for handling products to and from curing rooms and are using a jacklift truck, made by Lewis-Shepard Co., which is rolled under a rack full of products and made to raise the rack and bear it away and set it down in another place. They are well pleased with it and declare it is 100 per cent better than the car and transfer system, at about 50 per cent of the cost of installation and the big item is the saving of labor. One laborer does the work in handling block that formerly required two, and does it better.

R. W. Saathoff, a concrete stave silo builder of Litchfield, Ill., reports splendid business and bright prospects. He uses New Monarch Machine & Stamping Co.'s mold and a Blystone mixer.

Whitten Brothers have purchased a building on Scovell street, Alton, Ill., which they have remodeled and will engage in the concrete block manufacturing business. They have installed a heating plant and will make blocks all winter for the spring trade.

Concrete Silo Co., Bloomfield, Ind., manufacturers of interlocking concrete stave silos operate a Schenk drain tile machine, H. A. Smith silo molds, and a Kent mixer. Are interested in machines and molds for making roofing tile, building tile, chimney blocks, burial vaults, culverts, sewer pipe, septic tanks and fence posts.

The hand block machines sold by Besser Sales Co., 1310, Twentieth street, Alpena, Mich., are made in three models to make 16 inch, 20 inch and 24 inch length block. Any length mentioned can be made in either 8, 10 or 12 inch wall widths and in either 4, 6 or 8 inch heights. With the use of dividing plates fractional size block such as 8 inch square pier blocks, etc., can be made. These machines are characterized by a number of exclusive features which makes them the most rapidly operated and efficient machines of this type. Such features are the automatic sliding end doors which strip out with the cores troweling the end of the block and preventing sticking in the molds and permitting the use of wet mix. The automatic dividing plates also strip out with the cores thereby permitting fractionals to be made at the same speed as full size block. The oval cores facilitate tamping, prevent sagging or distortion of the block after removal from the mold and contribute to the strength; being automatically withdrawn they permit great speed of operation.

The Besser hollow building tile hand machine is constructed similar to the hand building block machine. The tile are made two at a time and can be made in either a 5x8x12 or a 5x12x12 inch size. They are made face down and any desired facing materials can be employed where desired.

The Waupaca Concrete Products Co., Waupaca, Wis., incorporated capital $30,000, by Wm. E. Hanson and H. E. Woody. They operate Ideal block machine and Anchor tamper, Dunn drain tile machine, New Monarch stave silo molds and a Blystone mixer. Are interested in the latest building block and roofing tile machines; want catalogs and prices.

The Hayden Automatic Block Machine Co., Columbus, O., have moved into a new factory.

The factory of the Springfield Cement Products Co., 460 Park Place, Springfield, O., is now being operated by Mr. Clem Beals. They have a Blystone mixer, Anchor tamper, Dunn drain tile machine and an Ideal block machine. Interested in silo molds, fence posts molds and conveyors for moving block racks.

The Dodge Line

EVERYTHING FOR THE TRANSMISSION OF POWER

The Best Since 1881

STANDARDIZED RELIABLE

Modeled by
GEORGE MULLIGAN
1920

Dodge Sales & Engineering Company, distributor of the products of the Dodge Manufacturing Company and the Dodge Steel Pulley Corporation. General Offices: Mishawaka, Ind. Works: Mishawaka, Ind., and Oneida, N. Y.
Canadian Plant: Dodge Mfg. Co. of Canada Ltd., Toronto and Montreal

Philadelphia Cincinnati New York Chicago St. Louis Boston Atlanta Pittsburgh Minneapolis Dallas Providence Seattle Newark

THE U. S. CHAMPION TILE

—Is a perfect and everlasting concrete roofing of artistic Beauty in any color desired—easily made and applied by anyone.

Our newly improved and patented tile machines are provided with a new device that makes automatically interlocks on both ends and sides of our tiles—an accomplishment of immense value for the roofing tile problem and characteristic for our tiles only.

Buy the U. S. CHAMPION TILE MACHINES for making FRENCH or SPANISH TILE. They help progressive builders and concrete products manufacturer cutting down the high building material cost besides giving large return from a small investment.

Write for description and prices

L. HANSEN CO.

3617 East 23rd Street, Kansas City, Mo.

the 3 essentials

Correct Mixing

Minimum Labor

Quality Products

The three elements to successful concrete block and tile factory operations are inherent characteristics of Kent Continuous Mixers.

Write for Catalog

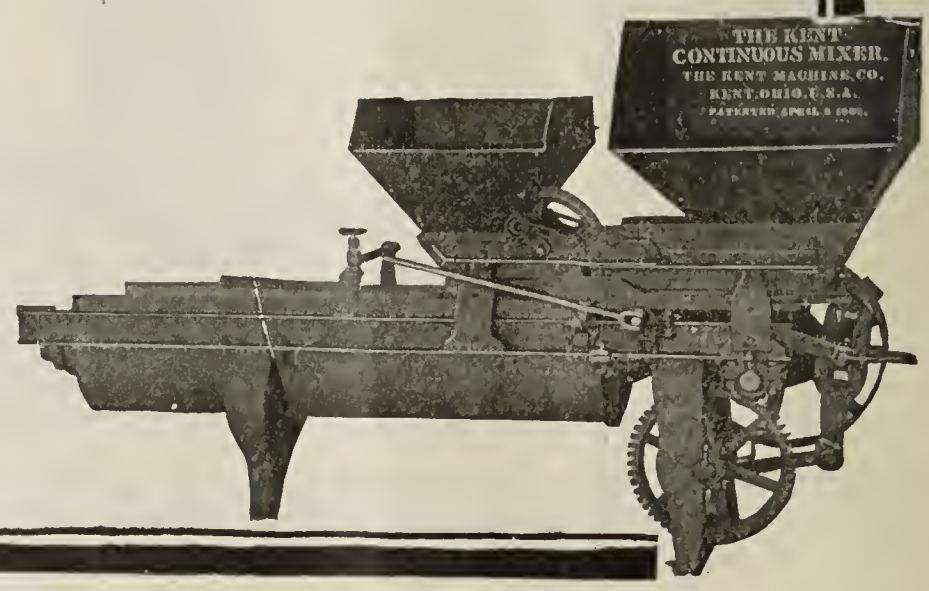
The Kent Machine Co.

Kent, Ohio

First, the Kent insures correct mixing. It is accurate in measuring, correct in proportioning, and thorough and uniform in mixing the aggregates for QUALITY concrete blocks and tile—at low cost.

Second, the Kent is a labor saving machine and holds down your pay roll. It does its own measuring, proportioning, mixing, watering and discharging accurately. The Kent operates entirely by itself. Unlike batch mixers, it requires no man labor beyond the loading operation. Keep the hoppers filled with sand and cement and the Kent automatically will serve to your block machines charging platform a continuous stream of perfectly mixed and moistened material.

Third, the Kent insures Quality products because it is designed especially for concrete products factories. It is simple to operate and does away with the cumbersome hoisting cars, charging platforms, chains, cables and whatnot found on many of the old-fashioned batch mixers.



Don't Shut Down Your Plant This Winter

—money in vaults

Winter is the busy time for the progressive concrete vault maker and the Automatic Sealing Burial Vault is one of the most profitable products you can make—100% to 200%.

In fact, the products maker who goes into the vault business in earnest usually makes more money out of it than he does from all his other products put together.

Equip your plant for a vault business this winter. We'll help you sell the vaults. Write us for complete particulars.

Automatic Sealing Vault Co.
216 E. River St. PERU, IND.

Contractor Specifies "Medusa for His Gwn Home

This charming residence at Portland, Oregon, was built by Mr. H. O. Triplett, a designer and contractor of that city, for himself.

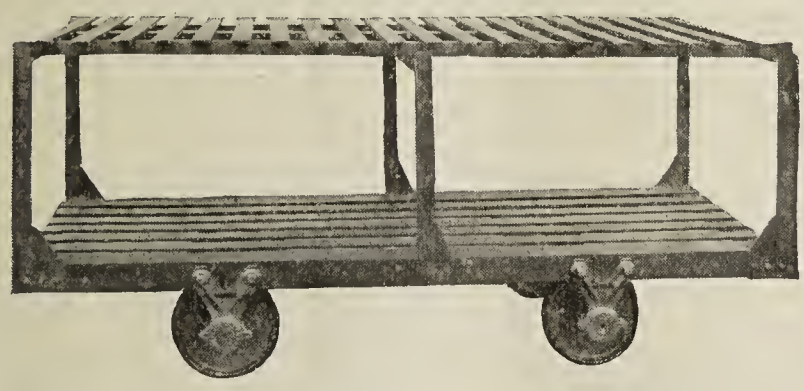
Specify and use Medusa Stainless White, plain or waterproofed, in your cement jobs, and Medusa Waterproofing in every concrete wall, foundation or floor where moisture must be kept out.

Write today for the Medusa Literature.

THE SANDUSKY CEMENT COMPANY
Department E Cleveland, Ohio

Ask to have your name placed upon the complimentary mailing list of "The Medusa Review."

MEDUSA Stainless White Cement



You buy CONCO service when you let us solve your hauling problems.

We build cars to meet YOUR REQUIREMENTS whether you manufacture brick, tile or concrete products.

CONCO cars are manufactured in single, double and triple deck types, with rigid or folding decks.

Efficient engineers, skilled workmanship and the best of materials make our products incomparable.

We also make steel pit cars and transfer cars of all types.

H. D. CONKEY & CO.
MENDOTA ILLINOIS

"Perfect" Concrete Block Power Machine

Also Hand and Power Brick Machines Hand Brick Machines Well, Cistern and Silo Molds

C. S. WERT Inventor and Patentee

Built entirely of steel and iron.

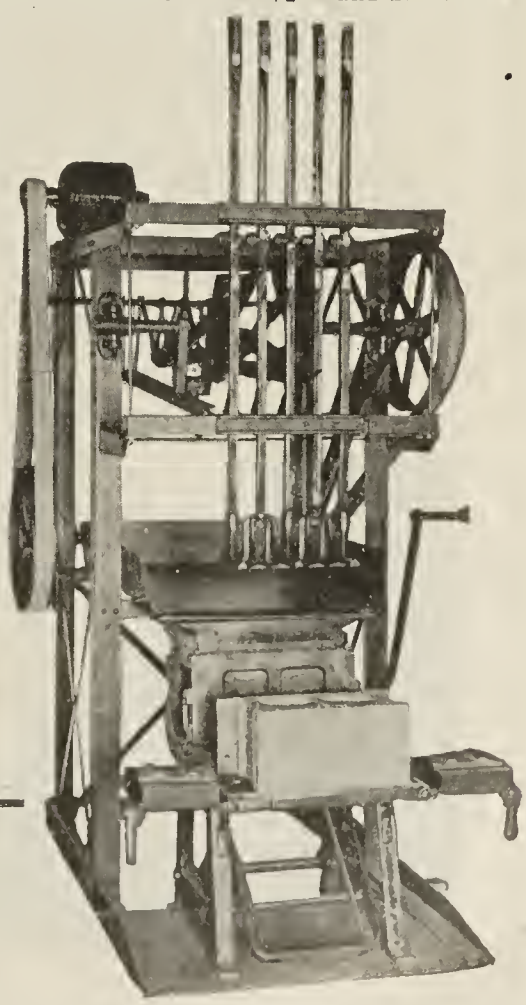
Turns out, with four men, 1,000 to 1,200 concrete blocks in ten hours.

In severe tests, Perfect Concrete Brick have proven stronger than common clay and pressed clay brick.

The power tamper may be operated by a one horse power motor, a 2½ horse power gas engine or direct from a line shaft.

"There is no better brick machine manufactured," says W. T. Sharp, of Montana, owner of a Perfect brick plant.

Get facts and figures now. Write while the matter is on your mind.



Manufactured by
The Wert Manufacturing Co.
547 Railway Exchange Bldg., Chicago

Concrete Products that—PAY BIG!

All over the country the demand for concrete products is many times greater than the supply. Drain tile, building tile, concrete block and brick, sewer pipe, ornamental concrete and other products are selling faster and at bigger profits than has ever been known.

Are you making the most of this condition? Are you shaping your production to meet the trades demands? Are you equipped to get *as much* of the business—and make as much money out of it—as present opportunities present?

Dunn equipment and Dunn co-operation help you to capitalize on the present boom conditions in the industry. Our proposition is vital to every man who is making—or going to make—concrete products.

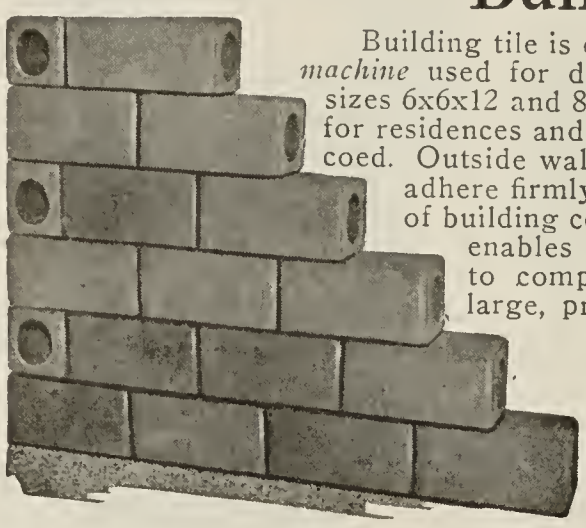
Concrete Drain Tile

At least three thousand more concrete drain tile plants are needed; every farming community requires at least one. Under average conditions a profit of $500 a month can be realized, and this without a large investment.

We have started hundreds in the drain tile business and on the road to independence. We plan with customers in plant layout, selection of equipment, manufacturing and selling methods, and offer live cooperation in many ways. Dunn equipped plants are well known for the quality of tile produced, and for their simple, economical operation.

Dunn complete plants are arranged for 2, 3 or 5 man operation, the selection depending on local conditions. All are adaptable to making drain tile of different sizes at the rate of 1500, 3000 and 6000 tile per day respectively. Complete plants include one or two Dunn Tile Machines, shovel mixer, power cars, pulleys, etc. We also plan equipment so that part of it can be used for the manufacture of blocks, brick, sewer pipe, etc.

Building Tile



Building tile is economically manufactured on the *same machine* used for drain tile. These can be made in two sizes 6x6x12 and 8x8x12 inches. Just the right product for residences and other buildings which are to be stuccoed. Outside walls are corrugated so that stucco will adhere firmly. Tile and stucco is the coming style of building construction; this machine and product enables the concrete products manufacturer to compete with the clay tile man for this large, profitable business.

W. E. Dunn Mfg. Co.
414 24th Street
HOLLAND, MICH.

Write us for information concerning the profits and possibilities in the manufacture of concrete drain tile, building tile, block, brick, sewer pipe and other concrete products. Our long experience, and the data we have collectd is at your disposal. Tell us which part of the concrete products you are most interested in—what experience you have had—whether you have a building and equipment. Consider us as your friends and advisors.

W. E. Dunn Mfg. Co.,
414 24th St.,
Holland, Mich.

Gentlemen:

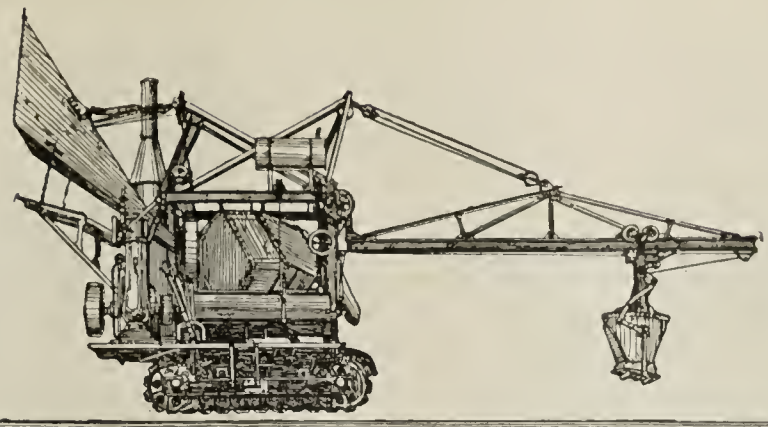
Kindly send us information in regard to manufacturing the products checked below. We understand you will give us complete data in regard to costs, profits, possibilities, without expense or obligation to ourselves.

Concrete Drain Tile.
Concrete Building Tile.
Concrete Block and Brick.
Concrete Sewer Pipe.
Ornamental Concrete.
Concrete Mixers.

Name .....

Address .....

.....



PAVER DRAGLINE TRENCHER LOADER MIXER

LOCOMOTIVE DITCHER

CLAMSHELL BACKFILLER

SKIMMER SHOVEL

As in all Austin products, speed, reliability and ruggedness are the features of the 28E Cube-Hex Paver. Simple in Design, powerfully built, it applies the cube mixing principle to produce perfect "dry mix" in the minimum of time; 28 cubic feet of concrete every minute. Always ahead of the men.

Paver booklet U21 tells about it
Write for it

Austin Machinery Corporation
(F. C. AUSTIN CONSOLIDATION)

Chicago Office: Railway Exchange Building
New York Office: 30 Church Street
Atlanta Office: 10 W. Harris Street

AUSTIN MACHINERY

MOVES THE EARTH - MIXES THE CONCRETE

REG. U.S. PAT. OFF.

1921

Are YOU Prepared?

Are you ready to deliver the goods when the customers step up to your plant and ask for building block, brick, structural tile, sewer pipe and drain tile? Are you ready to reap the profits that will go to the products manufacturer who is prepared to meet the demand for building materials that has already started to grow?

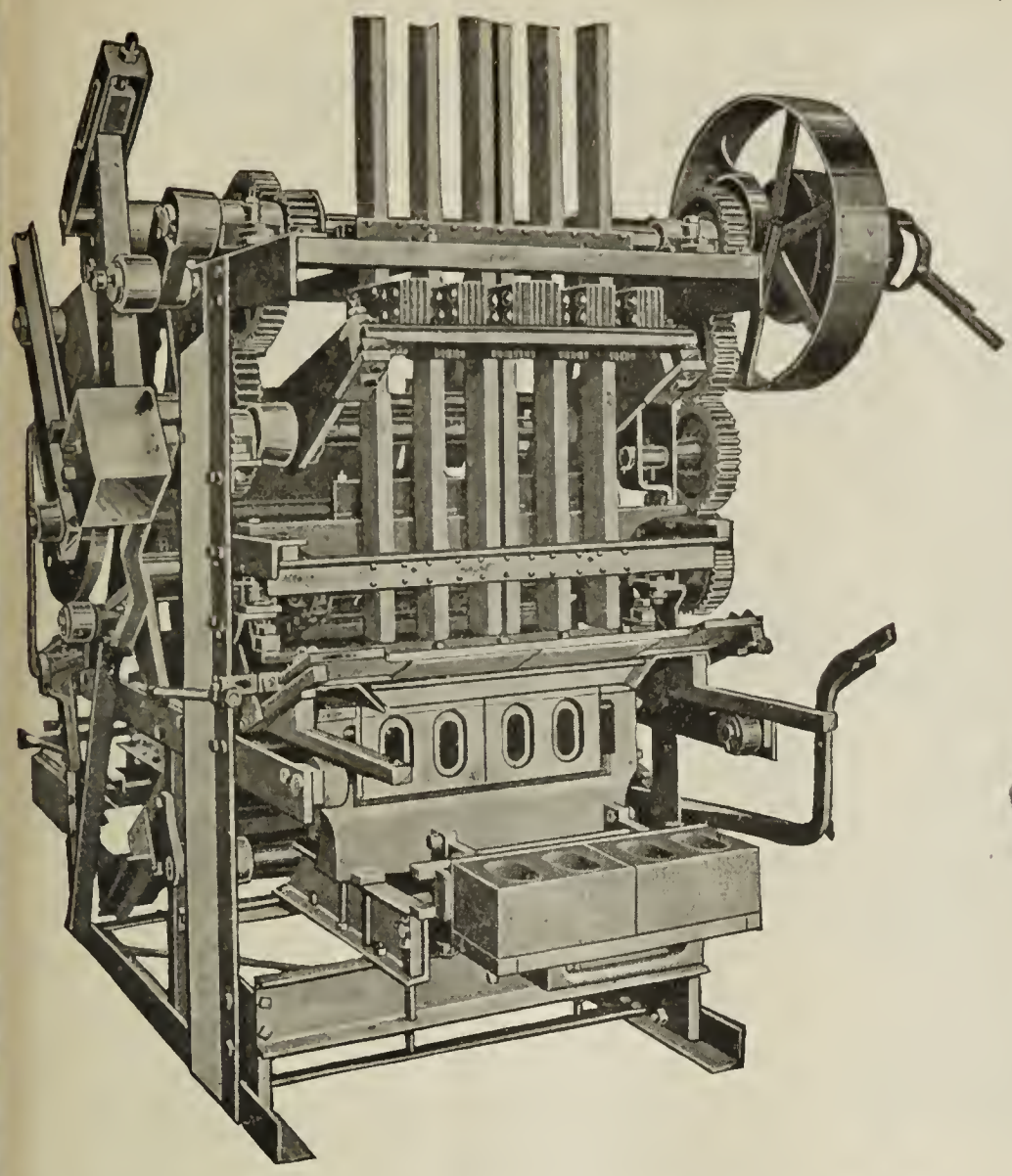
NOW is the time to act

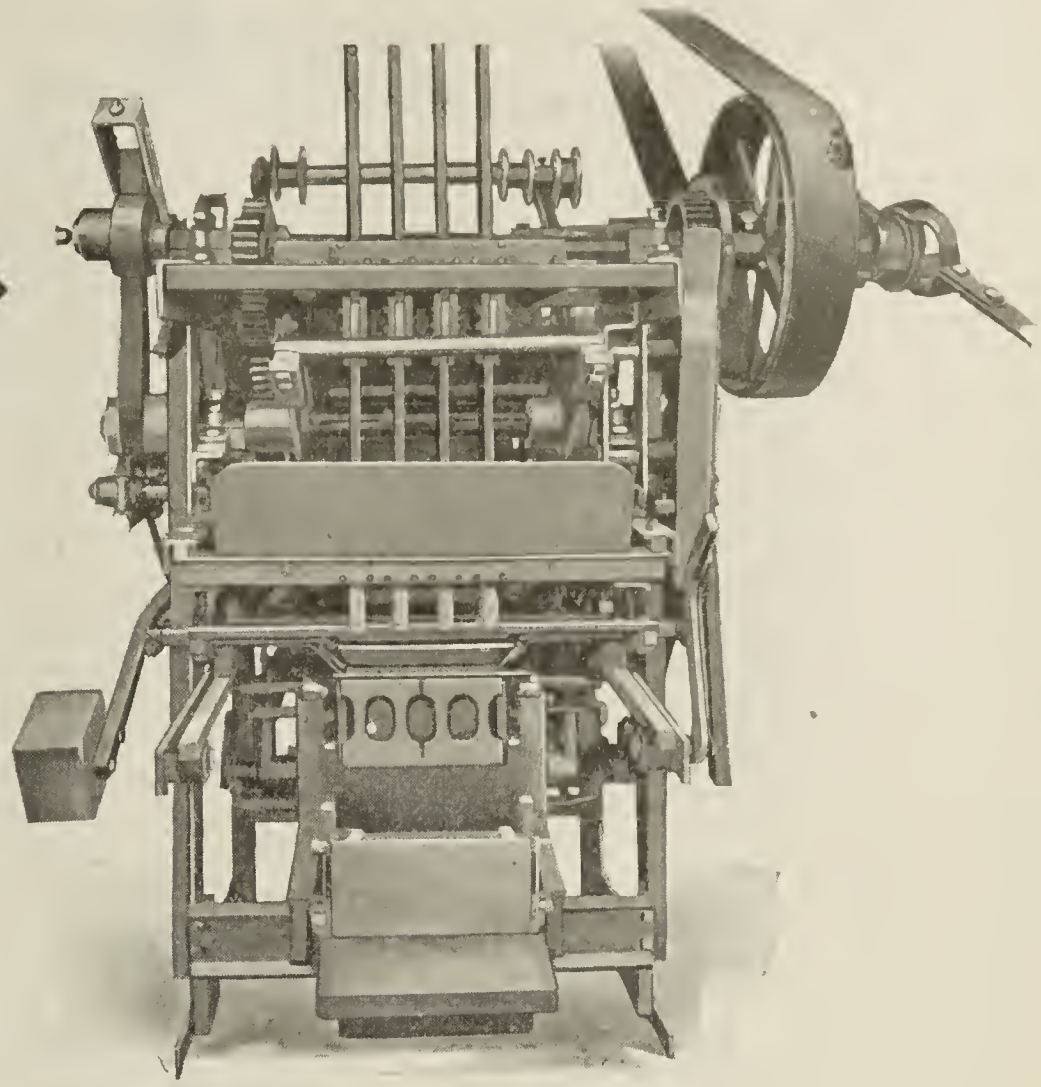
Now is the time to look over your plant, or your plans for a plant. Now is the time to decide on the type of products that you want to make and the output that you wish to secure. Now is the time to lay out the factory, order the machines and get them set up. If you wait until spring, when the demand or the products is big, you will wait until every other products' manufacturer has awakened to the situation, and is clamoring for machinery and equipment.

Get equipped RIGHT

Get your plant in order now. Investigate the Besser line of concrete products machinery. Learn just how the Besser equipment works, what kind of a product it turns out, how fast it does its business and how little labor is needed in a Besser plant. Find out how the Besser engineers can assist you in equipping your factory to manufacture a maximum output of products with the shortest possible pay roll.

The Besser Sales Co.





Here is a typical BESSER Machine

THE BESSER LINE

Ask for details on any of the following items of Besser equipment:

Single Automatic Block Machine for standard 8x8x16 in., 20-in. and 24-in. blocks.

Double Automatic Block Machine for standard 8x8x16 in. block.

No. 1 Automatic Brick Machine. Daily capacity 60,000 tamped brick.

No. 2 Automatic Brick Machine. Daily capacity 30,000 tamped brick.

Double Automatic Machine for light weight hollow building tile in sizes 5x8x12 in. and 5x12x12 in.

Double Automatic Machine for 4-in., 5-in., 6-in., 8x8x12 in. hollow partition tile.

No. 1 Drain Tile Machine for diameters 3 to 16 in. and in 12-in., 18-in., and 24-in. lengths.

No. 3 Power Tamp Drain Tile and Sewer Pipe Machine for diameters 6 to 36 in., and in 24-in. and 30-in. lengths.

Drain and Sewer Pipe Molds.

Chimney Block Machine.

Hand Brick Machine.

Hand Block Machine.

Hand Hollow Building Tile Machine.

Hand Drain Tile Machine.

7 cu. ft. Batch Paddle Mixer.

Continuous Mixer, capacity up to 100 cu. yds. per hour.

Cars, pallets, motors, engines, conveyors, belting, everything for the complete products plant.

Every Besser machine for the manufacture of concrete products excells in powerful automatic tamping. Surplus of material is fed into the mold in a series of charging operations. Heavy steel tamps compact and compress the materials to maximum density.

The machine to the right above is the Besser Single Automatic Block Machine making three tamped wet mixed concrete brick every minute. The machine to the left is the Besser Double Automatic Hollow Building Tile Machine, making six tamped wet mixed hollow structural tile every minute.

Concrete is discharged into the machine supply hopper, which measures and feeds the material to a conveyor, which elevates and automatically distributes same into the mold under the tampers. Each tamper weighs 120 lbs. The tampers drop simultaneously, each compacting only 1¼ lbs. of concrete with each blow on the block machine, and 4/5 lb. on the tile machine. Charging and tamping is repeated eight times. Surplus concrete is removed, a finishing plate moves in over the mold box, the tampers descend, striking three blows with their combined weight, still further compacting the block or tile. A special device prevents spreading of mold box. The result is block or tile of maximum density, exact as to size, with no pockets or soft spots.

The entire operation is automatic. There isn't a lever to be pulled for any of these operations. The machine keeps on delivering block or tile at the rate of three block or six tile per minute. The operator merely sees that the product is taken away from the machine. The only lever to be pulled is the one the man reaches for when five o'clock comes.

Better own a Besser than compete with one

BESSER PLANTS

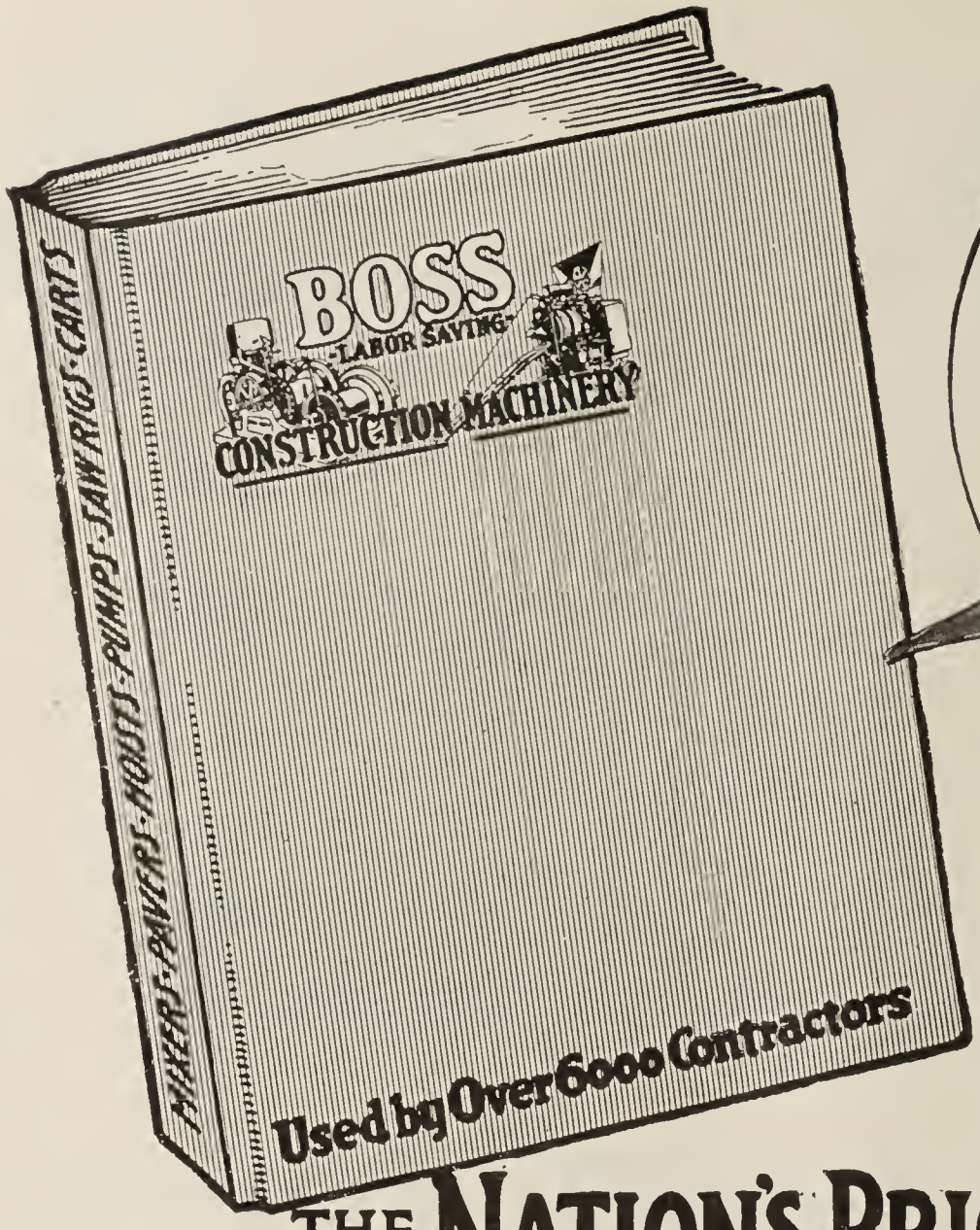
Here are a few plants that are using Besser equipment and making money with it. Ask them what machines they prefer:

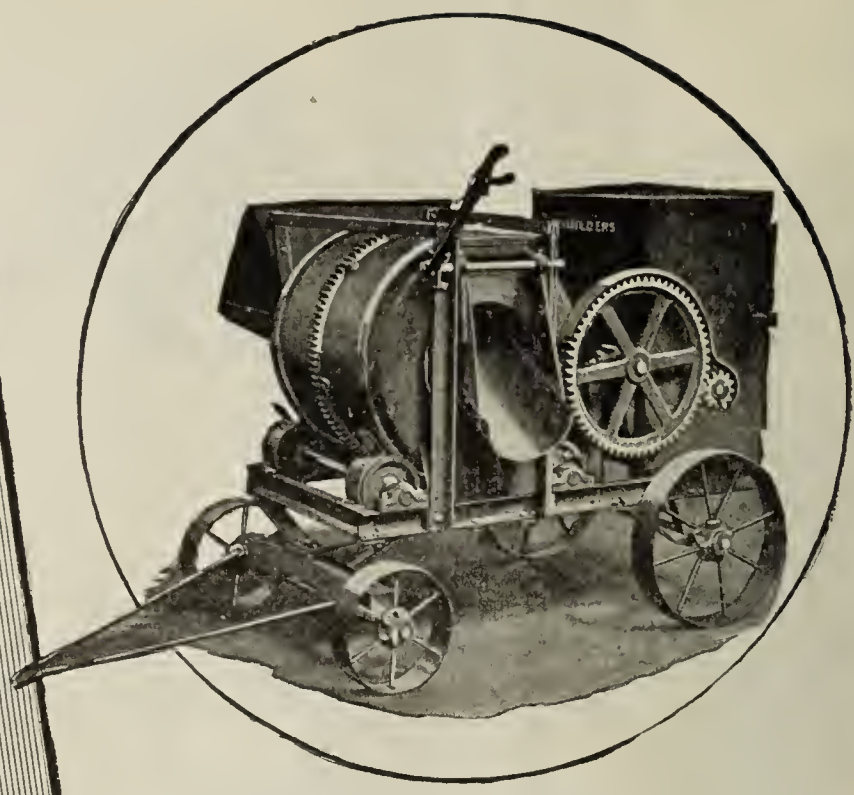
Eugene Concrete Works, Eugene, Ore.
Utah Fuel Co., Salt Lake City, Utah.
Nebraska Cement Stone Co., Wahoo, Neb.
J. D. Degginger, Webb City, Mo.
W. Puryear, Rochester, Minn.
Ideal Concrete Construction Co., Joliet, Ill.
O. L. Miller & Co., Indianapolis, Ind.
R. E. Hamilton's Sons, Detroit, Mich.
E. Fellabaum, Toledo, Ohio.
Schaeffer Bros., Rochester, N. Y.
Bridgeport Stone Co., Bridgeport, Conn.
Cement Products Co., New Bedford, Mass.
Twentieth Century Concrete Block Co., Audubon, N. J.
George J. Ehrgott, Bethlehem, Penna.
Biddle Concrete Co., Clarksburg, W. Va.
Aluminum Co. of America, Marysville, Tenn.
Cement Products Co., Winston-Salem, N. C.
Waller Construction Co., Miami, Fla.
Jahncke Service, Inc., New Orleans, La.

WRITE US NOW

No matter what kind of concrete products equipment you are in the market for, before you buy see what Besser has to offer. Don't wait until orders pile up and shipments are delayed. Get busy NOW.

1301 21st Street, Alpena, Mich.

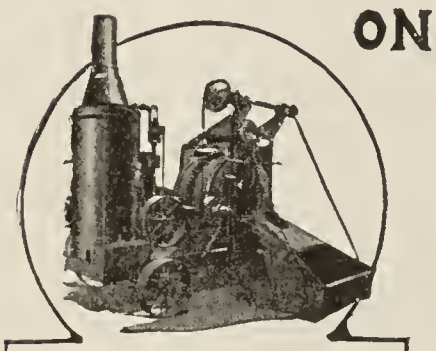




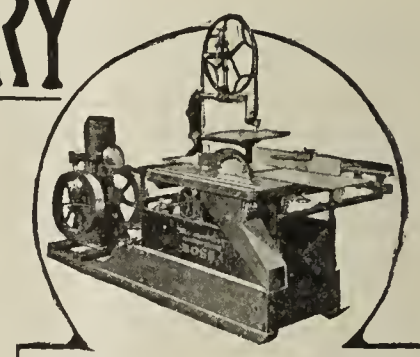
$245 BUYS THIS HALF-BAG LOW CHARGER
WITH NOVO ENGINE

Just one of the many real bargains in this book.

THE NATION'S PRICE MAKER ON CONSTRUCTION MACHINERY



½ to 4-Bag Capacity, Any Type Loader—Gas, Steam, Electric.



Portable Saw Rigs, All Attachments.

Write for your copy today with new 1920 prices

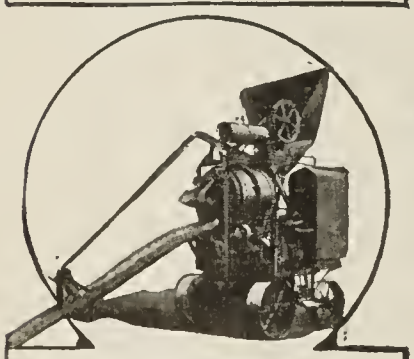
Don't Wait. Place your order this winter and get our special winter proposition.

Write or Wire

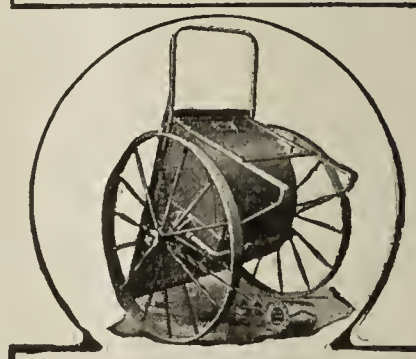
The American Cement Machine Co. Inc.

Keokuk Iowa
THE 300,000 H.P. ELECTRIC CITY

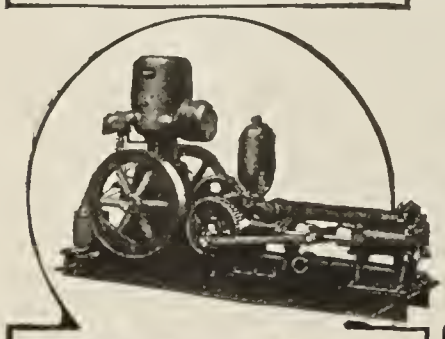
Branch offices—warehouses in all principal cities



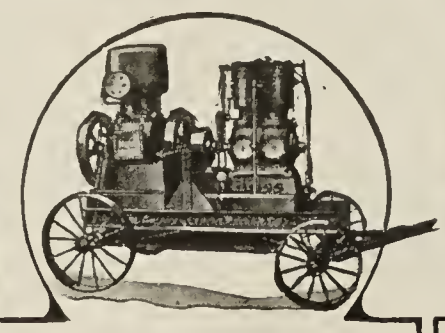
One and Two-Bag Pavers—High Drum.



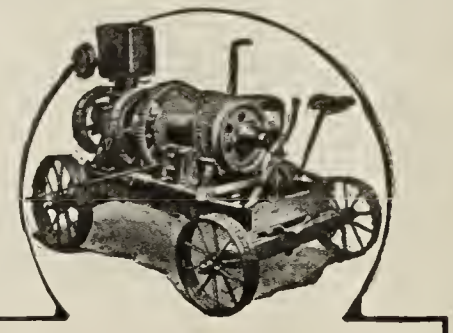
Hyatt Bearing Carts.



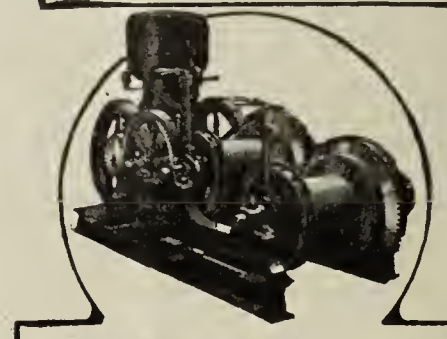
Force—Trench or Diaphragm Pumps—Gas, Steam or Electric.



Portable Air Compressors.



Heavy Duty Backfillers.



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First to Protect the Buyer

IN the early days of the Explosives Industry, dynamite was sold just as Dynamite. The user had no means of telling what strength powder he was using until the Du Pont Company inaugurated the standard practice of putting the exact strength of the explosive on every box and on every cartridge.

Explosives buyers were quick to recognize the value of this method of marking. As a result this practice was rapidly made a general one throughout the industry.

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Du Pont Service enters into every phase of the production and use of explosives. Our facilities in plant, laboratory and in the field have made it possible for us to develop this service to an unusual degree,—first in producing explosives of remarkable and uniform value; and second, in aiding our customers in all matters pertaining to their handling and use.

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E. I. DU PONT DE NEMOURS & CO., Inc.
Sales Department: Explosives Division
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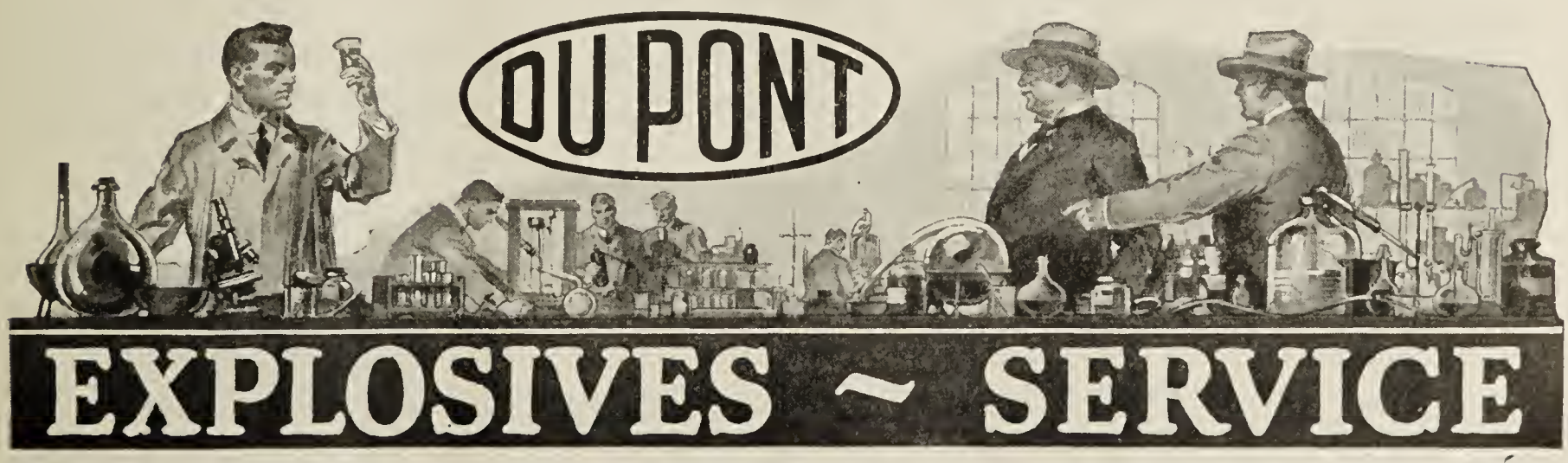

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A Complete Steel Trestle OPEN— Ready for Use.

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ECONOMY STEEL SCAFFOLDING

is being used by a number of leading Chicago contractors, such as Thompson Starrett Co., R. C. Wieboldt, Blome Sinek, E. W. Sproul & Co., Math Rauen Co., Gerhardt Meyne and many others, who will gladly recommend them to every contractor as a good asset in equipment.

The illustration is of the Mason Horse 4 ft. 6 in. high and 5 ft. 0 in. wide which weighs but 60 lbs., they are sturdy in construction and their compactfulness when folded makes them very easy to handle, transport or store.

A TRIAL ORDER WILL CONVINCE YOU THAT THEY ARE A NECESSITY.

Price $6.00 each, F. O. B. Chicago.

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SAUERMAN BOTTOMLESS POWER SCRAPERS ARE LABOR-SAVERS FOR SMALL GRAVEL PITS

Conservative claims for the smallest sizes of Sauerman Bottomless Power Scrapers, based on the statements of contractors and county road commissioners who are using them, are that a Sauerman scraper operated by one man will displace from 6 to 15 teams and slip scrapers. The larger sizes of Sauerman scrapers are considered by the commercial gravel producers who use them as being the equal of a small steam shovel with the added advantage that they will not only dig, but also convey the sand and gravel to the plant.

One road superintendent in Michigan who installed one of our ⅓ cu. yd. scrapers in the county gravel pit last Summer, writes in to say that it is saving the county $40.00 per day while doing the work that formerly called for a half dozen teams and scrapers.

A Wisconsin sand and gravel producer chose a Sauerman scraper in preference to any other type of equipment when he opened his first gravel pit about six years ago. Today he owns and operates four gravel plants and the excavating and conveying equipment is the same at all—Sauerman Bottomless Power Scrapers.

The many advantages of this one-man operated, combined excavator and conveyor are explained in our Pamphlet No. 10, with illustrations and diagrams of actual installations. Write for this booklet today.

Typical installation of Sauerman Power Scraper for hillside gravel pits.

Also, for Handling Coal

We manufacture a special type of bottomless power scraper (shown below), that is extensively used for storing and reclaiming coal and similar loose materials. Full description on request.

Sauerman Bros., 1139 Monadnock Block, Chicago

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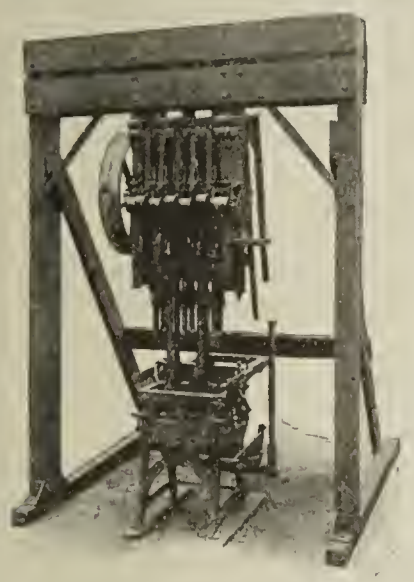

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The Ideal Concrete Machinery Company

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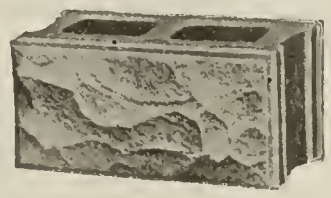
Increase and improve your production with power equipment. With Ideal Machines you make all types and designs of blocks. Equip your plant with machines that are a proven success and not an experiment.



Block Machinery
Catalog No. 35

Ornamental Mold
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Mixers
Catalog No. 33

Brick Machines
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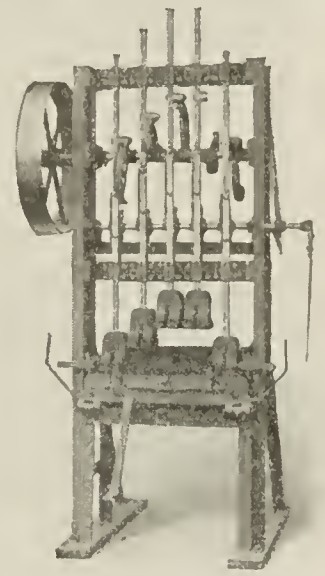

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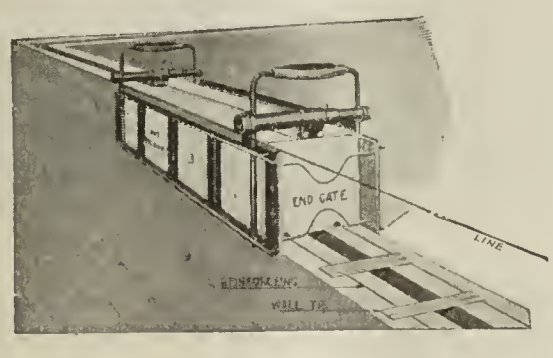

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Cheapest, best and most perfect way known to the building world.

The reason the most wall can be built for the least money with our forms is—because they are STRONGEST—LIGHTEST—SIMPLEST and MOST PERFECT, and the price of a complete set can be saved on one small job. Send for literature.

The Universal Cement Mold Co.

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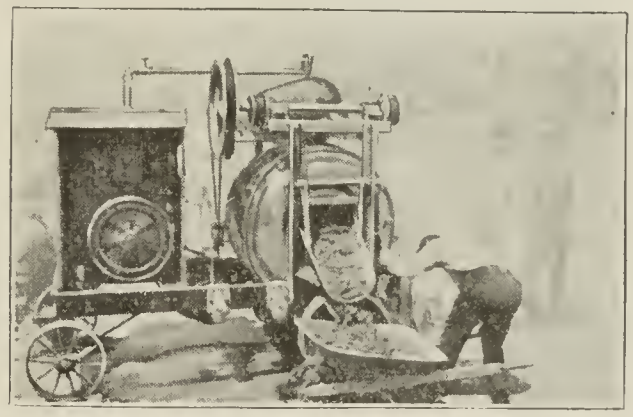

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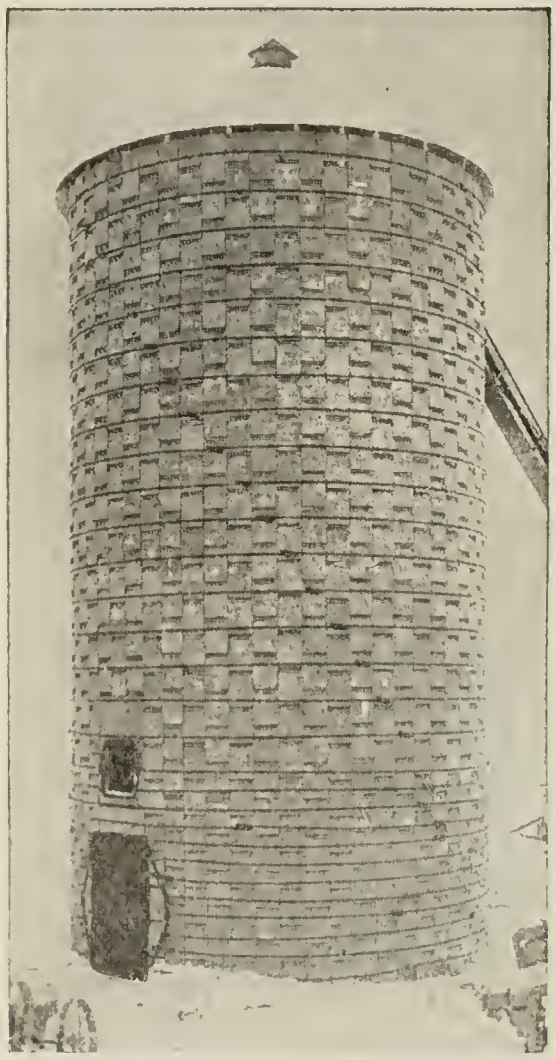


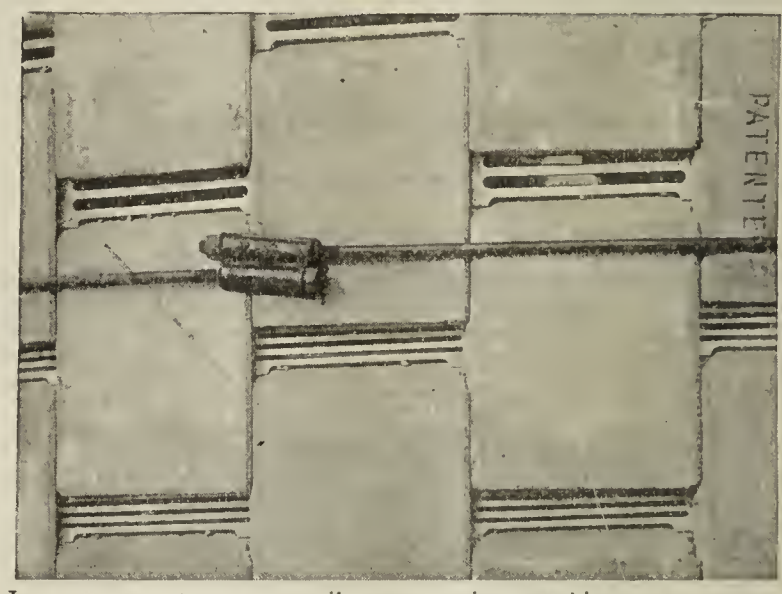
Irey cement stave corn crib on the farm of W. W. Walters, Wiota, Iowa—a fireproof, ratproof, and permanent structure.

Gives every rural contractor an opportunity to take advantage of the large demand for better Corn Cribs. Every farmer is a prospect for a concrete crib.

THE IREY PATENTED VENTILATED CONCRETE STAVE CORN CRIBS

are so built as to admit air and exclude rain and snow.

Making the staves is simple. Erection rapid. Every farmer is a booster. Any concrete man can establish a good paying business manufacturing and erecting these cribs. Investigate our proposition. Write for details.



Irey cement stave corn crib construction combines permanence and ease of operation with ample circulation through the contents.

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THE UTMOST IN
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STEAM SHOVEL CHAIN

The Chain that puts the SHOVE in Steam SHOVELS

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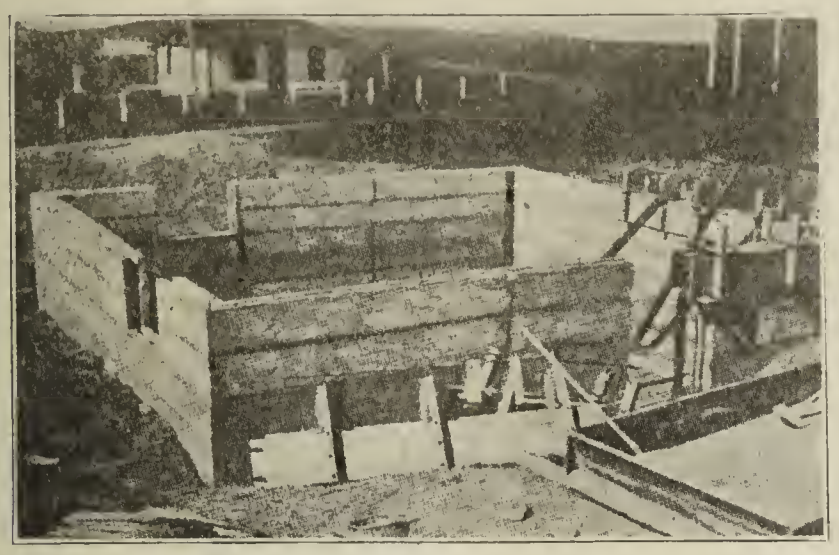
ADJUSTABLE TO ANY KIND OR SIZE OF BUILDING



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Moisture-proof, fire-proof, repair-proof walls. Save paint, lath, time and labor to you. Save repair, fuel and insurance to the owner.

Forms adaptable to any size building, adjustable to any thickness wall. Built of poured concrete, reinforced three ways with continuous dead air space makes the most desirable method of building construction. Simple to use, easily adjustable. No skilled labor required. Method has been tried and proven.

Write for complete description of method and its operation, photos showing work done, and costs.

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FOR the stucco suburban home—the modern public utility plant and factory—the bank and office building—first call is for Middlebury Terrazzo for facing concrete work.

Middlebury Terrazzo has all the appearance of solid marble—with all its advantages and at a material saving in price.

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Send today for free samples and prices

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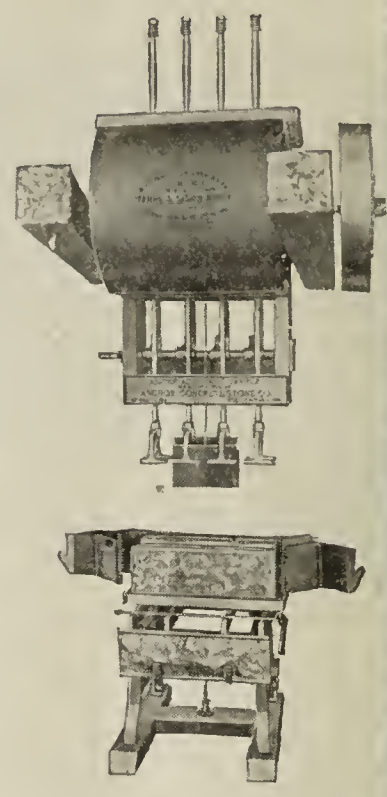
THE wonderful simplicity and reliability of the Anchor Automatic Tamper together with its adaptability to any type of Block, Brick, or Stave machine has caused a demand for this tamper equalled only by those demands which come from home-builders insisting that their homes be built with Anchor Continuous Air Space blocks like those shown in this border.



The Anchor Concrete Machinery Company

Home Office: Rock Rapids, Iowa Branch Office: Columbus, Ohio

Members of the Concrete Block Machinery Association

Concrete Blocks, Bricks Building Trim, Posts, Ornamental Work, Etc.

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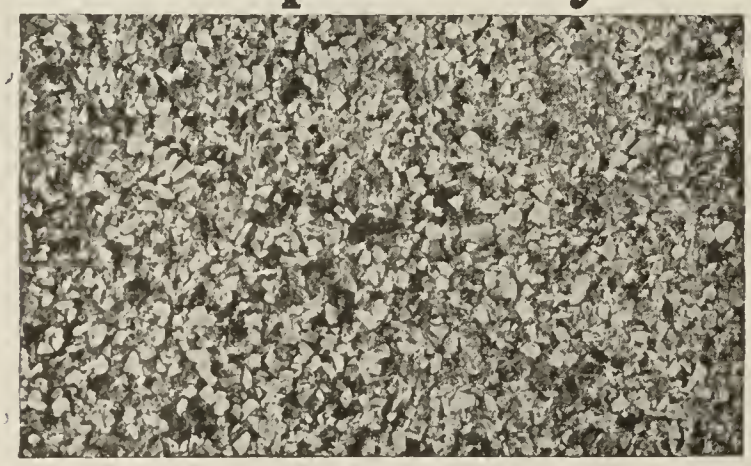

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Made in six scientifically milled sizes, extremely hard, sharp and free from dust. Insures strength and beauty. Booklet "Micaspar and How to Use It," with free samples mailed on request.

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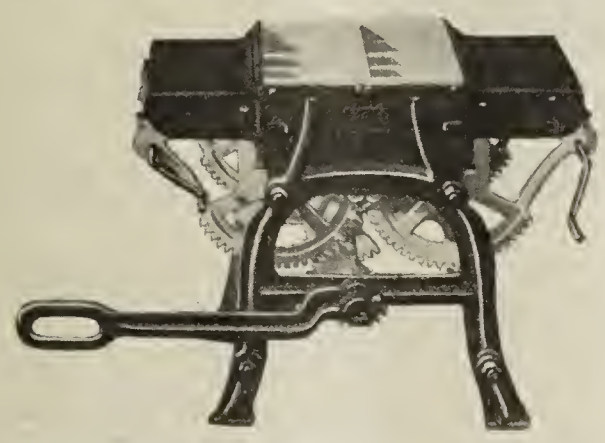

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DOUBLE-SPEED

Brick and Block Machines

Now is the time to increase the capacity of your block plant—turn out the maximum number of wall feet per day, while the demand for building materials is at its highest.

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Our Double-Speed Block Machine makes in each operation: 2 hollow blocks, 2 silo blocks, 2 solid blocks, 2 slabs, 4 half blocks, 2 water table slabs, 2 return ends, 2 chimney blocks, or 2 porch pier blocks.

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Double-Speed Brick Machine makes 16 brick at each operation, 8 brick being delivered at each side of the machine.

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This power tamper gives our block machine a capacity of 1,500 blocks per day and speeds the brick machine up to 15,000 brick per day. Roller-cut-off removes surplus material from mold box and finishes the top of the product. The block and brick are tamped rapidly and vigorously, resulting in a dense, strong product. Machine consumes little power and is practically fool-proof.

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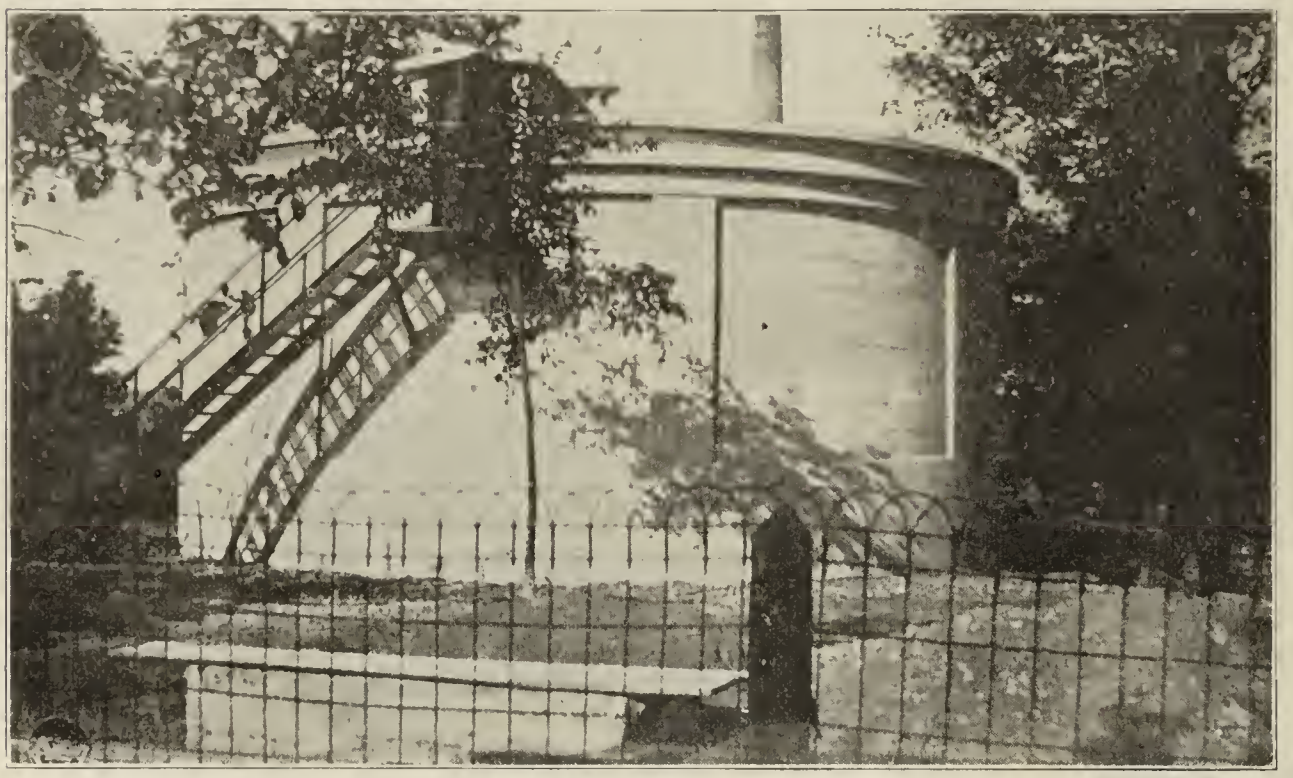
In Roadways, Bridges, Culverts, Sidewalks, Gutters, Curbs, Retaining Walls

Recent investigations and experiments by prominent highway engineers have led them to recognize in HYDRATED LIME an effective, safe and suitable material which may be used as an admixture with concrete to obtain a degree of permanency in concrete road construction not heretofore realized.



View of the concrete reservoir erected by the City of New Ulm, Minn.

The floor, walls and roof are of a 1-2-4 mixture, with addition of 5 per cent hydrated lime. After the removal of the forms, a 1-2 mixture of cement mortar, including 10 per cent hydrated lime and 3 per cent cement waterproofing, was applied to both inside and outside walls as a finishing coat, about ½ inch thick.

Hydrated Lime in Concrete Roads

It Facilitates the Handling and Placing of the Concrete and Is Productive of the Following Results:

1—Increases the plasticity and homogeneity of the mass, causing the concrete to flow more readily into place, and increasing the covering capacity and spreading qualities of the cement.

2—Reduces to a minimum the tendency towards segregation.

3—Causes the retention of a sufficient amount of moisture in the concrete while setting to aid further hydration of the cement and to reduce the risk of shrinkage cracking.

4—Being a void preventative, it renders the slab less porous and more impermeable, largely reducing the alternate absorption and expulsion of moisture, thereby minimizing expansion, contraction, internal stresses, and cracking, which arise mostly from changes in moisture content.

5—Produces density and uniformity in the finished concrete, thereby adding to the life and efficiency of the road by elimination of stone pockets and other sources of irregularity in strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

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Lee Lime Co., Lee, Mass.

White Marble Lime Co., Manistique, Mich.

Glencoe Lime & Cement Co., St. Louis, Mo.

Ste. Genevieve Lime Co., St. Louis, Mo.

Rockland&RockportLimeCorp. New York—Rockland, Maine—Boston

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

National Lime & Stone Co., Carey, Ohio

Ohio Hydrate & Supply Co., Woodville, Ohio

John D. Owens & Son Co., Owens, Ohio.

Woodville Lime Products Co., Toledo, Ohio

Merion Lime & Stone Co., Norristown, Pa.

American Lime & Stone Co., Tyrone, Pa.

Vermarco Lime Co., West Rutland, Vt.

Nast Bros. Lime & Stone Co., Marblehead, Wis.

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Simplest Mixer Made

Here is a real mixer at a resonable price. Turns out a perfectly mixed batch in one minute. Will mix up to 30 cubic yards in 8 hours, and will pay for itself in three weeks. It will do the work of four men, and do it better.

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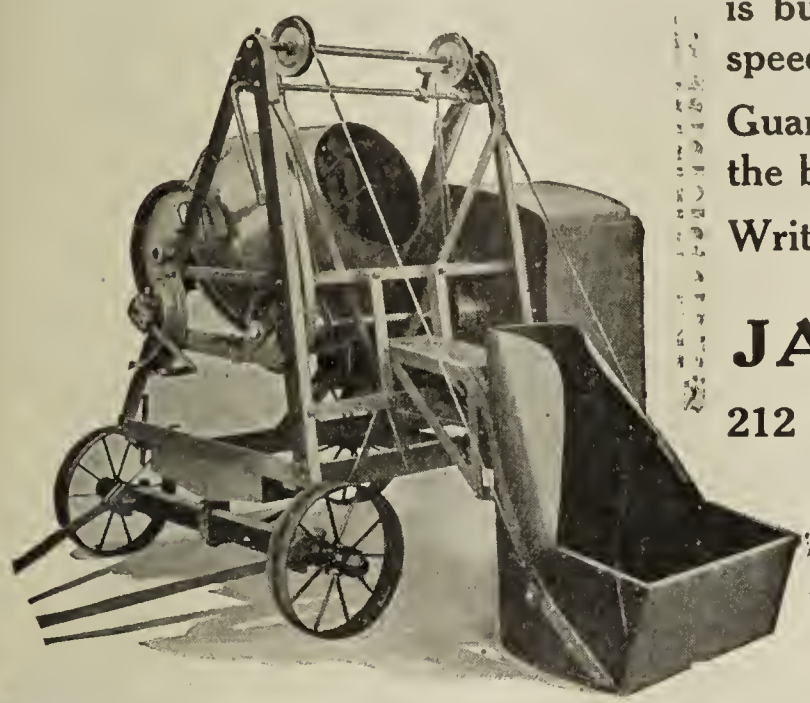

is built especially for the averaged sized job, where speed and portability are essential.

Guaranteed to be constructed of the best materials in the best mechanical manner.

Write for further information.

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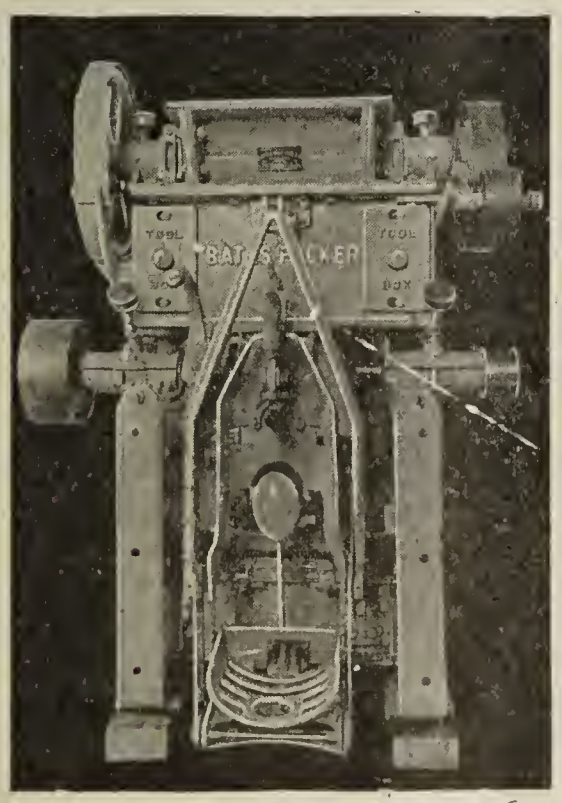

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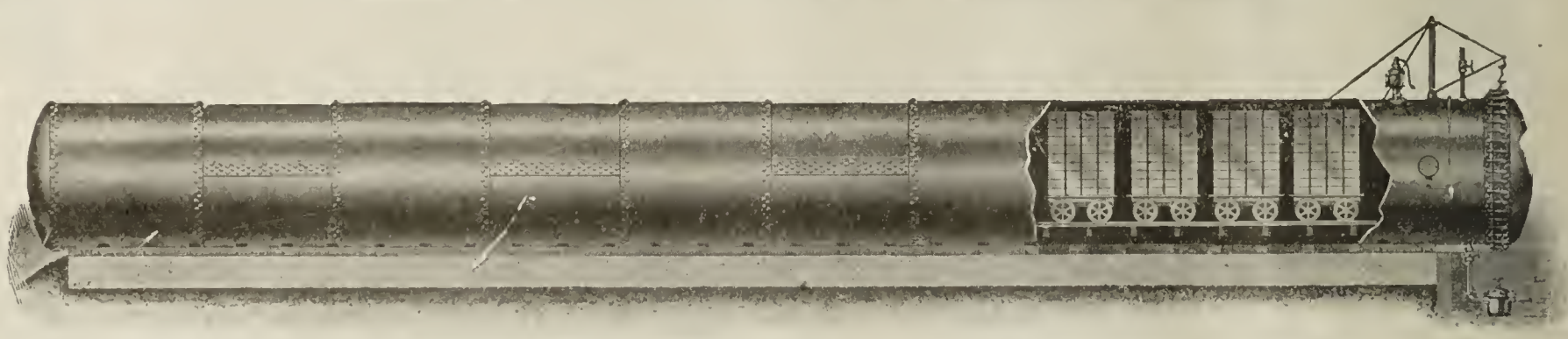

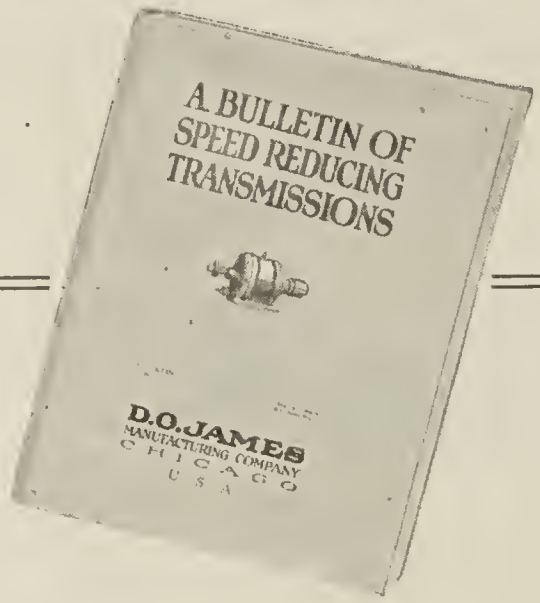

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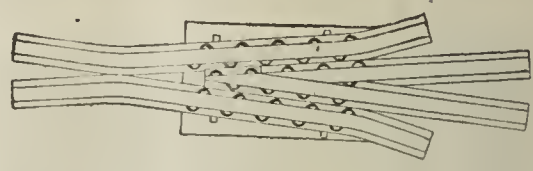

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The fact that twenty-five to thirty per cent of the total cost of production in a cement plant is for power—makes it important to give consideration to power economy.

Individual motor drives eliminate any wastage of power on intermediate transmission apparatus such as line shafts, belts, pulleys and steam lines. Furthermore, they enable each machine to operate at the exact speed for correct production.

Westinghouse engineers have helped many successful cement plants to solve their power problems, by installing Westinghouse electrical equipment specially designed to meet cement mill requirements. They will gladly serve you in the same capacity.

WESTINGHOUSE ELECTRIC & MFG. CO.
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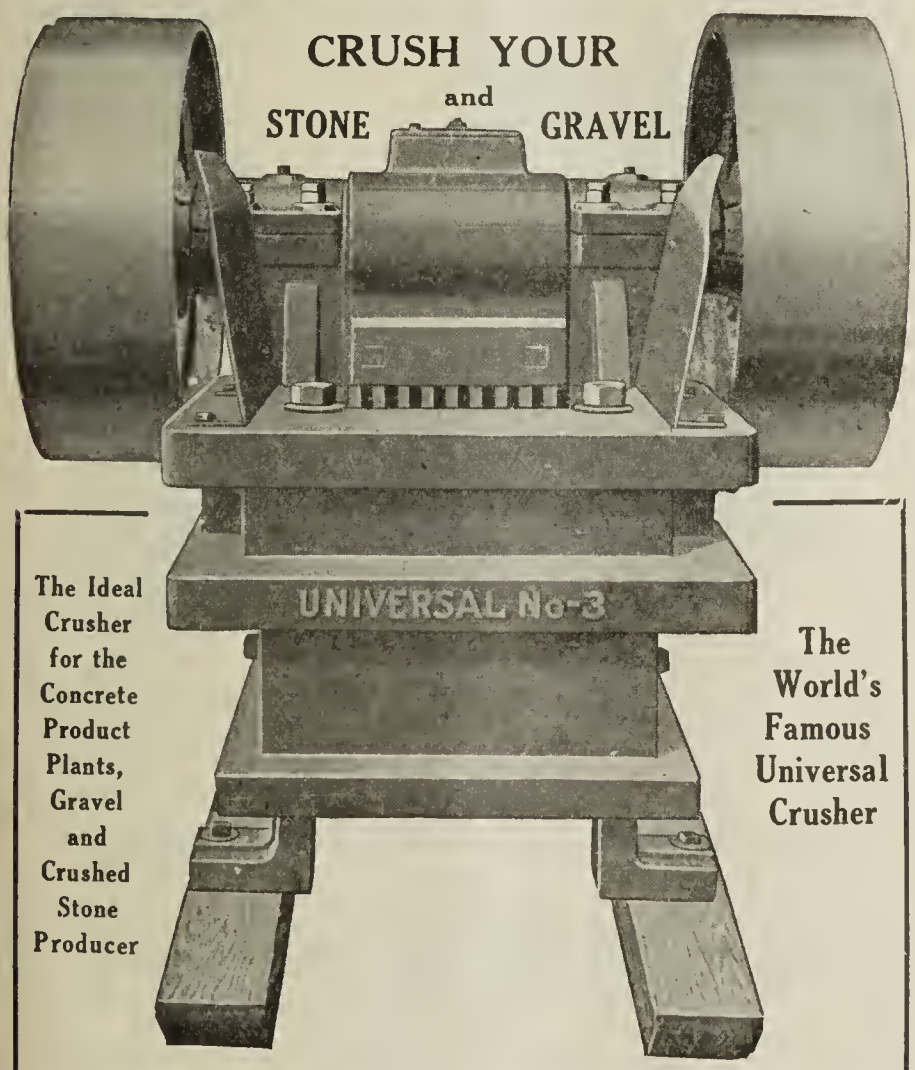
CRUSH YOUR
STONE and GRAVEL



The Ideal Crusher for the Concrete Product Plants, Gravel and Crushed Stone Producer

The World's Famous Universal Crusher

We Build Crushers from 5 Tons to 300 Tons per 10-hour Capacity

Instantly adjusted to produce size required from ¼ inch to 3 inches. *Write for Folder No.* 14.

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Save more than they cost!

In these days it isn't entirely a question of how much it will cost to replace worn-out equipment. It's more a question of whether or not you can get new equipment at all. It's therefore doubly essential that you take proper care of those machines you are now fortunate enough to have.

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American Steel & Wire Concrete Company's Reinforcements fulfills every engineering requirement.

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Havemeyer Bars
"EVERY POUND PULLS"

COMPLETE REINFORCING SERVICE
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All-Steel Machines for All Kinds of

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Lock Seam Pipe with the smooth inside surface, having already furnished large quantities for Potash Recovery plants, we are able to give especially careful attention to the construction of this class of Pipe.

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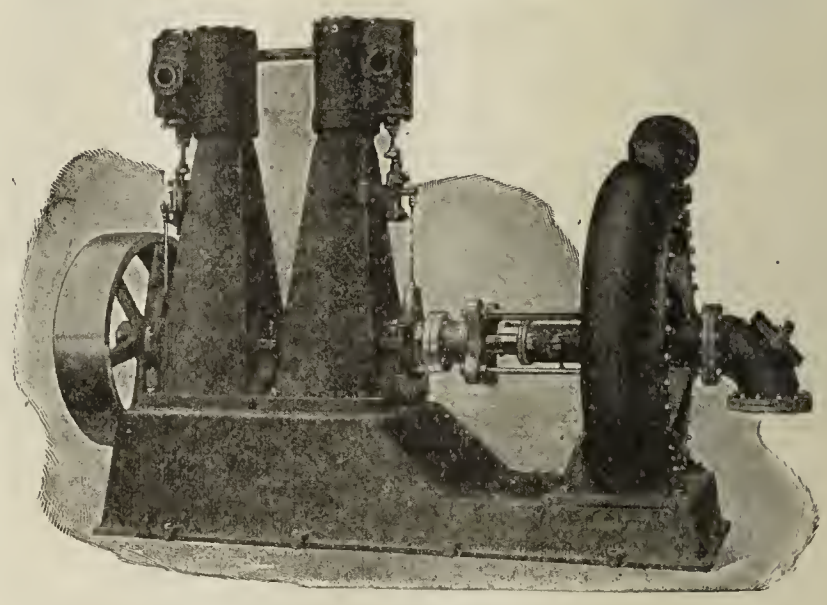

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Small sizes as well as largest ones are designed to give maximum output and greatest wear for a given weight.

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Many buyers now take advantage of facilities at mill by ordering bars cut to length, bent to shape, and tagged—ready for placing.

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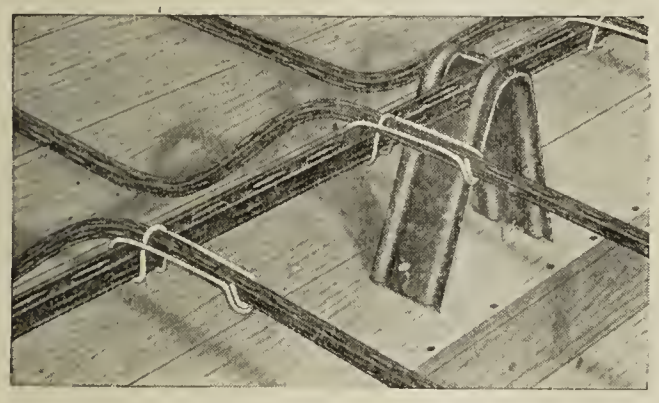
The secret of added strength in concrete structures is obtained by using **HAVEMEYER BARS** and this added strength is insured by properly placing and securing the reinforcement with



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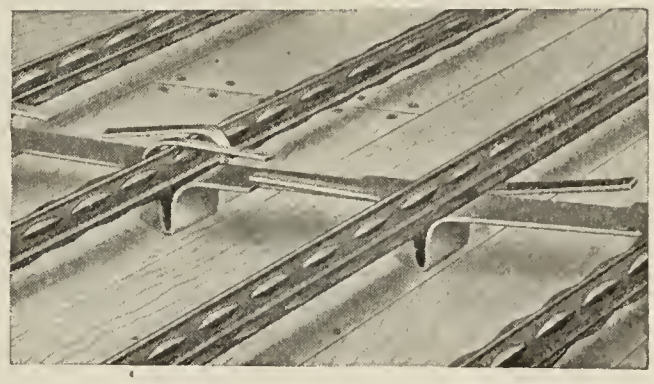
For supporting head rods over column heads and for over direct bands in flat slab and bent bars over beams in beam and girder construction.

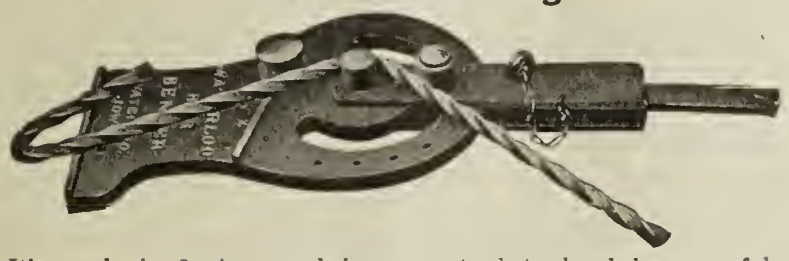
HAVEMEYER PRODUCTS

Concrete Steel Co.
Monadnock Block
CHICAGO



SLAB BAR-SPACER
For supporting and spacing bars in the slab.

Contractors can't afford to be without
The Waterloo Bar Bending Machine



It's made in 2 sizes, and is guaranteed to bend bars as follows: No. 2 bends cold reinforcing bars including 1⅛ in. round or square. Price $30.00. No. 3 bends cold reinforcing bars including 1¼-in. round or square. Price $35.00.

Bends bars to various angles desired. Has a detachable handle 7 feet long for convenience in handling.

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Portable and Industrial Track, Tie Plates, Switch Stands, Rail Braces, etc. Can make prompt shipments.

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We own and offer the following NEW RAILS for prompt shipment:

12-lb. rails, angle bars, bolts and nuts.
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They will be gone soon. Write or wire for our quotations. Also No. 1 70-lb. A. SCE Relayers with Webber Joint.

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2—6"x22' Power & Mining Tube Mills.
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2—No. 3 Universal Williams Mills.
2—42" Fuller Mills.
1—No. 8 Allis-Chalmers Crusher.

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NEW G. E. SLIP RING MOTORS

1—150 H.P., 440 v., 600 R.P.M.
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1— 50 H.P., 220 v., 900 R.P.M.
1—20 H.P., 220 v., 1200 R.P.M.
1—15 H.P., 220 v., 1200 R.P.M.
1—10 H.P., 220 v., 1200 R.P.M.

All motors can be reconnected for 220 or 440 v.

2—50 H.P., 125 v., Western Electric direct current generators, direct connected to Erie Ball Engines.
1—85 K.W., 2300 v., 900 R.P.M. Western Electric, type S15AO, 3 ph., 60 cy. alternator, complete.
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1—250 KVA. Westinghouse, 240 v., 602 ampere, 3 phase, 60 cycle, 2000 R.P.M. alternator, complete.
1—300 KVA., 440 v., 720 R.P.M., General Electric, type ATB, new, 3 phase, 60 cycle alternator, complete.

Large Stock, All Sizes, A. C. and D. C. Motors—New and Used.

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For immediate Delivery—Overhauled and Guaranteed—Largest Stock in America to Choose From. For Sale: 3 Phase, 60 Cycle, 220 V.

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1— 3	—Westinghouse ...	1200	3—15	—Fairbanks - Morse, slip - ring, constant speed.....	1200
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1— 7½	—General Electric..	1800	1—15	—Westinghouse vertical	1135
1—10	—Westinghouse ...	900	2—15	—Allis-Chalmers ...	1130
2—15	—Westinghouse, Type CCL	1750	2—15	—Allis-Chalmers ...	860
2—15	—Watson, slip-ring, var. speed	1720	2—15	—Westinghouse ...	850
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Capital and Surplus, $500,000.

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1—5x6-in. Lidgerwood Double-cylinder, Single-drum Hoisting Engine, with boiler.
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DUMP CARS

150—12-yd. Western Oliver All-steel, Two-way Dump cars.
2—6-yd. Western Two-way Dump Cars.
50—1¼-yd. 20-in. gauge, Wood Body, Two-way Dump Cars.

CONCRETE MIXERS

1—No. 1 Chicago Concrete Batch Mixer, with steam roller and engine on wheels.

STEAM SHOVELS

6—95-ton Bucyrus Railroad Type, 5-yd. dipper; 90 per cent new.
10—70-ton Bucyrus, Railroad Type, 2½ to 3-yd. dipper; 90 per cent new.
1—American Ditcher (can be used for excavating or as locomotive crane.)

PUMPS

1—6-in. Swaby Horizontal Centrifugal Pump.
1—8-in. Fairbanks - Morse Horizontal Centrifugal Pump.
1—10-in. Fulton Horizontal Centrifugal Pump.
1—12-in. Worthington Horizontal Centrifugal Pump.
1—24-in. Kingsford Horizontal Centrifugal Pump.
2—4-in. Young Horizontal Centrifugal Pumps.

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1—425-ft. Chicago Pneumatic Steam-Driven Air Compressor.
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1—125-ft. Bury Steam-Driven Air Compressor.
1—100-ft. Ingersoll Belt-Driven Air Compressor.

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10—Open Top Storage Tanks, 40 in. wide, 66 in. deep, 77 in. long; $\frac{3}{16}$-in. material.
1—Open Top Tank, 6 ft. 6 in. wide, 6 ft. 6 in. high, 6 ft. 6 in. long; $\frac{3}{16}$-in. material.
2—Open Top Tanks, 72 in. dia., 7 ft. 6 in. deep; bottom course ⅜ in., top course, ¼ in.
1—Steam Jacketed Steel Vat, oval bottom; inside dimensions 48 in. dia., 84 in. long, 30 in. deep; $\frac{5}{16}$-in. material.
1—Vertical Round Open Top Corrugated Seamless Welded Storage Tank, 9 ft. 6 in. dia., 16 ft. 8 in. high; capacity about 9,000 gallons.
30—High Pressure Tanks, 20 in. by 9½ ft., 150 lbs. pressure.

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1—10-ton, 3-wheel Steam Road Roller.
17—½-yard Bottom - dump Concrete Carts.
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No. 7½ Austin Gyratory Stone Crusher.
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1—25 H. P. Charter Horizontal Gasoline Engine.
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1—8x12 Allis Chalmers Jaw Crusher.
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Two 13-ton Standard Gauge Whitcomb gasoline locomotives. Also have two steam driven air compressors, 365-ft. and 900-ft. capacity. Would like to exchange for electric driven compressor, of about 400-ft. capacity, driven by 440 volt motor.

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12 Tube-Cottrell Precipiator Apparatus—15 K V A Capacity. Complete in all respects and in first class condition.

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1—18 Gates K.
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1—7½ Austin.
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2 sets 36-in. Rolls.
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1—50-Ton Baldwin 6-Wheeled Switcher.
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1—18-B Bucyrus Traction
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Bargains in quarry equipment, including elevators, screens, compressors, drills, hoisting engines, boilers, etc.

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Wanted to buy 2 Rotary Kilns not under 125 ft. in length.

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Fuller Mill, 42-inch Fan discharge type, in excellent condition. Used but few months on less than 1,000 tons soft rock. For immediate delivery, and quick cash sale. Address, Box 1001, care of Cement & Engineering News, 22 Quincy St., Chicago.

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1—18-B Bucyrus, traction, revolving, steam shovel.
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2—50 H. P. and 1—35 H. P. Buffalo-Pitts hauling engines.
40—50,000 lbs. capacity flat cars, standard ga.
1—7½ McCully gyratory crusher.
1—10x22 Acme jaw crusher, complete plant.
10—4-yd., 2-way dump, 36-in. ga., Continental cars.
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Also a large number of other shovels, locomotives, cars, rail, hoists, cranes, crushers, dryers, screens, elevators, conveyors, pumps, engines, etc.

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1—No. 3 Gates and 1—No. 6 Allis-Chalmers Crushers, elevator screens, 150 hp. Ball Steam Engine. $6,250, f. o. b. cars.

1—No. 5 Gates, Style D, regular drive.
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1—No. 6 Gates, Style D, left hand drive.
1—Elevator, 52 buckets, 30-in. belt, 32-in., 3 ft. 6 in. inside of frame concave belt conveyor, 33 ft. long, 24-in. belt, 2 ft. 6 in. inside of frame, one screen 14 ft. x 44 in., one screen 22 ft. x 44 in., shafting, pulleys, hangers, belting and 2 overhead hoists for repair work.
1—72x16 Return Tubular Boiler, butt strapped, triple riveted.
1—14x24 Buckeye horizontal engine, wheel 28-in. face by 9-ft. diameter, Worthington duplex pump, air compressor.
15—2-yd., 40-in. gauge special built end dump cars and 20-lb. rail.

This is a complete and perfect plant.

Complete line of Locomotives, Shovels, Cars, Graders, and general line of quarry and contracting equipment

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Sand and Gravel Plant. All machinery in first class condition. Plant can be seen in operation. Address Box 1190, care Cement & Engineering News, 22 Quincy St., Chicago, Ill.

WANTED

One two-way Traveling Electric Crane overhead on stationary towers or traveling towers on ground rails with or without towers structure capacity from eight to fifteen tons, state general condition and lowest price. Stop traveling monorail overhead on towers with or without structure, capacity five to fifteen ton electric, state general condition and lowest price.

National Cement Co. - Ragland, Ala.

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Quarry foreman, one familiar with steam shovel operation and well hole blasting, output 1,000 tons per day. State age, experience, salary expected and when could report for duty. Address Box 1121, care Cement & Engineering News, 22 Quincy Street, Chicago, Ill.

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Experienced Kiln Burners, Kilns 8x100 ft. and firing with fuel oil, 8 hour shift, dry process, pay satisfactory. Communicate with Riverside Portland Cement Company, Riverside, Cal.

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Mechanical Engineer, technical, eight years' experience in the design, construction and operation of Cement Mills.

Address, Box 1021 care Cement & Engineering News, 22 Quincy Street, Chicago.

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Mechanical Engineer, seven years cement mill experience, designing, operating and construction.

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Gasoline Locomotive made by Milwaukee Locomotive Mfg. Co.
7 ton—42-inch gauge
4 cylinder 35 H. P. Engine
Recently overhauled and in good condition. Price.....$1,500
Value very much greater.
Location: Crystal City, Missouri.

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1—220-volt D. C. motor-driven Hayward Clam-Shell Bucket, complete with controller, etc. Capacity 1½ cubic yards. Practically new.

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Immediate Shipment

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500	Tons	40-lb.	Relay	1000	Tons	75-lb.	Relay
500	Tons	56-lb.	Relay	200	Tons	80-lb.	Relay
500	Tons	60-lb.	Relay	1000	Tons	85-lb.	NEW
300	Tons	70-lb.	Relay	1000	Tons	90-lb.	NEW

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WE HAVE ON HAND AT OUR YARD—All sections of light rails, new and relay, for immediate shipment.

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Re-laying Rails

all weights and sections

Also Spikes, Bolts and Accessories. Rails cut to lengths for Buck Stays, Bracing, etc.

Punchings for Cement Crushing

WANTED

One 36x60 Jaw Crusher, or larger. One No. 18 Style K Gyratory Crusher, or approximately its equivalent. Give full particulars and state lowest cash price in first letter.

Georgia Cement & Stone Co.,
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TWO ALLIS CHALMERS TUBE MILLS

in good operating condition. Twenty feet long and five feet 6 in. diameter with chilled cast iron linings, feeders, drive gears, pulleys, pinions, shafts and bearings. Also twenty tons of new concavex slugs. Price right for quick sale.

STASO MILLING CO.
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CRUSHERS

Two No. 6 and two No. 7½ McCully Gyratory Crushers

All four machines in good condition. Manganese fitted. Several extra parts included in sale. Can now be seen in active operation crushing hard trap rock.

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No. 90 Marion on Standard Gauge Railroad Trucks

30-ft. boom, 20-ft. dipper handle. Bucket 4 ft. 3 in. by 3 ft. 8 in. by 4 ft. Good condition. Immediate delivery.

PUMP

Blake & Knowles Suction Pump

10-in. suction, 8-in. discharge. Capacity about 450 gal. per min. This pump has had very little use, and is practically as good as new.

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One Lambert double drum hoisting engine, 6½-in. bore, 11-in. stroke.

One Flory double drum hoisting engine, 5-in. bore, 9-in. stroke.

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24 Manganese Plates

These make six complete sections of 60-in. diameter circular screen, each section 30 in. long, 3-in. perforations. ¾ in. thick. New—never used.

DRILL STEEL

269 feet of ⅞-in. Hollow Hexagon Drill Steel

Lengths from 14 ft. 1 in. to 18 ft. 9 in.

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820 ft. of 2-in. graphite laid Manila transmission rope

Made by Wall Rope Company.
New—never used.

Birdsboro Stone Company
1004 Land Title Bldg., Philadelphia, Pa.

1—Koehring Paver, Size 14, boom and bucket.
21—K & J, 6 Yd. Std. Gage Dump Cars, overhauled.
1—70-Ton Bucyrus Shovel.
1—65-Ton Bucyrus Shovel.
1—Marion Model 60 Shovel.
4—36 in. Gage Vulcan Locomotives.
2—Floating Derricks.
1¼ and 3-Yd. Haywood Orange Peel Buckets.
1—Yd. Hayward & Williams Clamshell Buckets.
1—Traveling Derrick, 50 ft. boom complete with 3-drum 9 x 10 engine and bucket.
1—8½ x 13 D.D. Mundy Hoisting Engine with Boiler.
1—7¼ x 10 D.D. Mundy—Skeleton.
Derricks, pipe, timber, pumps, ties, etc.

J. T. WALSH
514 Brisbane Bld., Buffalo, N. Y.

FOR SALE

Controlling interest in modern cement brick plant operating in centrally located progressive midwestern city with unlimited supply of raw materials. Capital invested $125,000. Daily capacity, 30,000 bricks. Trade established and will make money for right party. Best reasons for selling. Write **D. B. care Cement & Engineering News, 22 Quincy St., Chicago, Ill.**

NORTHWESTERN CONCRETE SHOW

Under the auspices of the Concrete Products Association of Minnesota in the

ST. PAUL AUDITORIUM

ST. PAUL, MINNESOTA

February 22, 23, 24, 25, 1921

DO YOU REALIZE

—that the war prices of lumber, tile, brick, etc., have turned the trade towards concrete products.

—that concrete is very rapidly taking its proper place among building materials?

Let's keep this a-going—take space—show your products—show your machinery—there never was a better or more logical time to do this.

5,000 invitations and programs have been sent to products plants, contractors, architects, and equipment men. Be sure you get yours—then boost and push—now is the time.

TECHNICAL
and
POPULAR SUBJECTS
By Nationally Prominent Speakers:

National concrete housing convention exhibit.
Northwestern architects exhibit of small house plans.
Exhibits of concrete products and concrete machinery.
Moving pictures and entertainments.

For further information and display space—address

Concrete Products Association of Minnesota 404 Commerce Bldg. St. Paul, Minn.

THE HIGH COST WAY

Which Do You Prefer?

Compare the two illustrations for efficiency in loading sand, gravel, crushed stone and other loose materials.

The old, slow, laborious hand shoveling method, with its heavy expense, confusion and delays in loading, and the

Jeffrey Radial Loader

which requires only one unskilled laborer to operate—eliminates expensive waiting time of trucks and releases 5 to 10 men for work where they are actually needed.

Radial Loaders are built in two sizes: Type "K" will load 1 cubic yard per minute. Type "G" 1½ to 2 cubic yards per minute.

Which do you prefer? You owe it to your business to be among the progressives. Ask for full particulars, and catalogs Nos. 288-D and 309-W on the Radial Loader.

The Jeffrey Mfg. Co.

914 North Fourth Street, Columbus, Ohio

THE LOW COST WAY

CEMENT AND ENGINEERING NEWS

with which Gravel & Stone Magazine is Incorporated

22 Quincy Street, Chicago.

(PUBLISHED MONTHLY)

William Seafert, *Publisher and Editor*

J. F. Waldron, *Advertising Manager*

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United States, Canada, Philippine Islands and Mexico, $1.00 per year; all other countries, $1.50 per year.

Single Copies 20c.

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Send in your remittance for renewal promptly. Your name will be dropped from our mailing list after second notification.

Advertising copy or changes in ads. must be in this office by the 25th of each month, as hereafter our magazine will appear on the 5th of the following month

Advertising Rates Sent on Application

Vol. 33 CHICAGO, February, 1921 No. 2

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STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY

CRUSHERS, GRANULATORS, GRINDERS, PULVERIZERS,
SCREENS, MIXERS, ELEVATORS, CONVEYORS, CHUTES.

AN "OPEN-DOOR" PULVERIZER FOR CEMENT-CLINKER, LIMESTONE, ETC.

Release the bolts, throw open the door and every wearing part is within easy reach. One man can open a 5-ton door in a few minutes.

A GREAT TIME AND LABOR SAVER

Unequaled in Capacity, Small Power Consumption, Cheap Upkeep, Accessibility and Simplicity

CEMENT CLINKER

To 20 mesh: 80 to 100 bbls. per hour
To 40 mesh: 60 to 80 bbls. per hour
To 60 mesh: 40 to 50 bbls. per hour
To 80 mesh: 30 to 40 bbls. per hour

LIMESTONE

To 20 mesh: 16 to 20 tons per hour
To 80 mesh: 8 to 14 tons per hour

BUILT IN 5 SIZES **SEND FOR CIRCULAR**

STURTEVANT MILL CO., BOSTON MASS.

HARRISON SQUARE

NEW YORK, SINGER BLDG. CHICAGO, PEOPLES GAS BLDG. PITTSBURGH, 1ST NATL. BANK BLDG. ATLANTA, HEALEY BLDG.

The Bradley Hercules Mill

Built for the Preliminary Pulverizing of Cement Materials

In Operation at the Largest and Most Successful Cement Plants Since 1913 —More Popular Than Ever and More Successful

13 Mills Sold to Pennsylvania Manufacturers
Other Installations in Tennessee—New York—North Carolina—
Illinois—Oklahoma—California—Washington—Cuba—Argentine

It's the largest preliminary machine manufactured adapted for pulverizing Cement Rock, Limestone or Clinker.

One manufacturer with two mills ground 170,000 barrels Clinker in one month—another manufacturer has averaged 40 tons per hour, when grinding Limestone over a period of several years of operation.

It's a Wonderful Labor and Power Saver

Our Engineers will gladly show you how this mill will reduce your present operating costs, using your present tube mill equipment, and increase your output.

BRADLEY PULVERIZER COMPANY

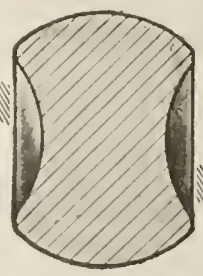
Works: Allentown, Pa. **BOSTON, MASS.**

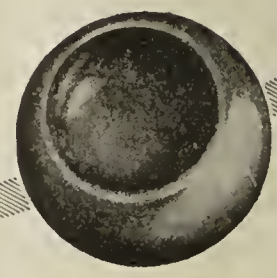
Manufacturers of Pulverizing Machinery for 30 Years

FOR MOST EFFICIENT
FINE GRINDING

CONCAVEX

PATENTED





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MILWAUKEE, WIS. U. S. A.

Ruggles Coles Dryers

A few materials dried in Ruggles-Coles Dryers.

Clays
Coal
Coke
Concentrates
Fullers Earth
Gypsum
Kaolin
Limestone
Marl
Ores
Phosphate Rock
Salt
Sand
Shale
Stone
Tankage
Wood Chips

ARE you desirous of obtaining a dryer that will give you maximum capacity on the lowest cost basis without sacrifice in efficiency? Well! you will find that dryer among the eight standard types of Ruggles-Coles dryers, made for drying by means of direct heat—indirect heat or steam.

Our dryers are designed simply but strongly with a view of withstanding the severest usage and giving the operator long, uninterrupted service with the greatest possible conservation of time, fuel and labor.

We invite correspondence relative to your drying problems. With 27 years' experience in the solution of rotary and paddle dryer questions, we are well equipped to definitely recommend the most suitable type of dryer.

Ruggles-Coles Engineering Company
50 Church Street New York City

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RED STITCHED CANVAS BELTING

"THE BELT OF SERVICE"

We could cheapen Hettrick in many ways but then it would be merely "belting" and not Hettrick. We create conveying and transmission service by building WEAR into every foot of HETTRICK.

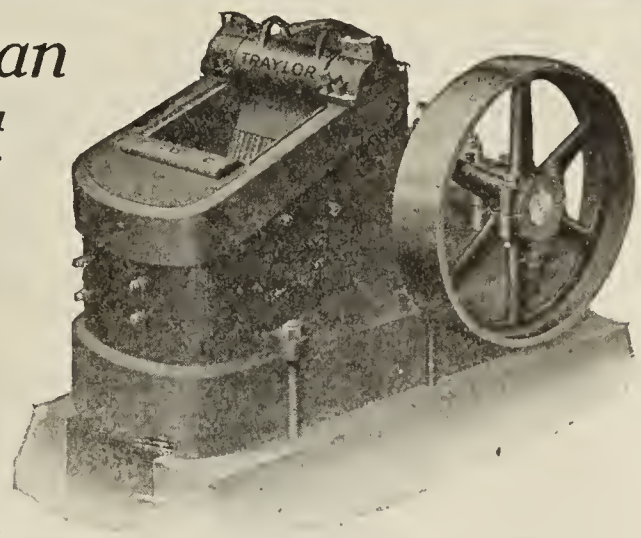
It is this sturdy dependable quality that enables us to guarantee HETTRICK to WEAR much longer.

When you need new belting be sure to order HETTRICK. Every user a satisfied customer.

Write for Prices

THE HETTRICK MANUFACTURING CO.
TOLEDO, OHIO

Traylor "Bulldog" Jaw Crushers Mean a Saving at Any Crushed Stone Plant



One method of designing crushers is to make them so massive throughout that it is practically impossible for them to be subjected to strain. Yes, they crush but the cost of operation is terrific.

Traylor Engineers strove to design the lightest yet the strongest crusher possible, that's why the frame of every "Bulldog" Jaw Crusher has a steel band shrunk on it top and bottom and all are equipped with the "Bulldog" Toggle system, the pitman of which is by far the lightest yet strongest of its kind being; made of wrought-steel tension members.

And it's this fine balance of weight and strength that makes the "Bulldog" crusher so economical to the user. Ask your neighbors about the power costs of their "Bulldog" Crushers.

TRAYLOR ENGINEERING & MFG. COMPANY, Allentown, Pa.
New York Chicago Pittsburgh Los Angeles Spokane
Truck and Tractor Division, Cornwells, Bucks Co,, Pa.

For Immediate Delivery

10 in. x 20 in. Type "A" Jaw Crusher
14 in. "Bulldog" Gyratory Crusher
No. 7½ Gyratory Crusher
36 in. x 16 in. Type "A" Crushing Roll

And the Same Economy That's Found in Traylor "Bulldog" Crushers is Built in Traylor Motor Trucks and All Purpose Tractors

Start construction early-Move materials NOW

Avoid the Construction Difficulties of 1920

CAN unprecedented demand for construction materials overhangs the market. Once released, this demand can be met satisfactorily only through cooperation of the various agencies interested.

Owners and public officials must mature plans quickly, so that

Contractors can order material early

Dealers can build up stocks

Manufacturers can ship promptly, and

Railroads can handle business offered quickly.

Had such a policy prevailed throughout the period since the armistice, the difficulties experienced in carrying on construction work during 1920 would have been considerably lessened, if not entirely avoided. Contracts for an enormous peace-time construction program were awarded too late in 1919 to permit of completion during that year. This deferred demand came upon an unprepared market and was carried over into 1920, only to be still further hampered by the large construction program of that year. Not only was the greater portion of 1919 lost, but the construction industry impeded by railroad congestion was thrown into such turmoil in 1920 that only a cessation of contract letting could clear the situation.

Five years' accumulation of construction still awaits contract letting. If such contracts are awarded early in 1921 and construction proceeds in an orderly, intelligent and efficient manner, material manufacturers and railroads can meet the situation. Unless this plan is followed, difficulties even more serious than those of 1920 can be expected. You share with others a measure of responsibility in preventing a recurrence of such a situation.

Due to handicaps beyond its control, the cement industry operated at only approximately 70 per cent of capacity during 1920. Notwithstanding earnest and sustained effort on the part of cement manufacturers, many users were disappointed due to their inability to get shipments when and where wanted.

Transportation is the neck of the bottle regulating capacity of industry and distribution of its products. Cement is now available everywhere. Manufacturing capacity has always been equal to any calls made upon it unless demand has been concentrated within comparatively short periods.

There's no time like Now to move materials.

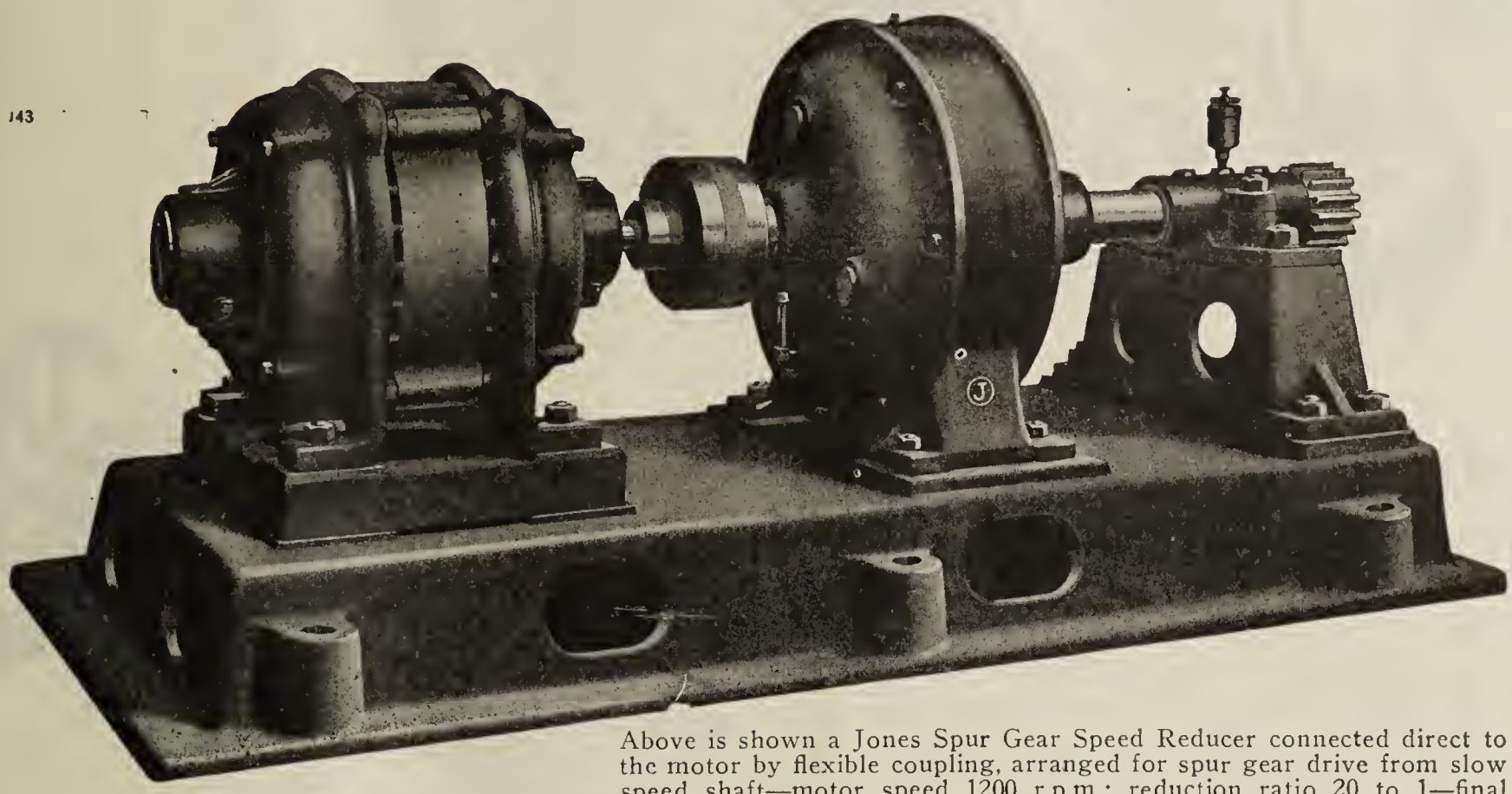
PORTLAND CEMENT ASSOCIATION

Atlanta				San Francisco
Chicago	Detroit	Los Angeles	Parkersburg	Seattle
Dallas	Helena	Milwaukee	Pittsburgh	St. Louis
Denver	Indianapolis	Minneapolis	Portland, Oreg.	Vancouver, B. C
Des Moines	Kansas City	New York	Salt Lake City	Washington

Start construction early-Move materials NOW

WHAT SPEED REDUCTION FOR YOU?

2 to 1?
20 to 1?
200 to 1?



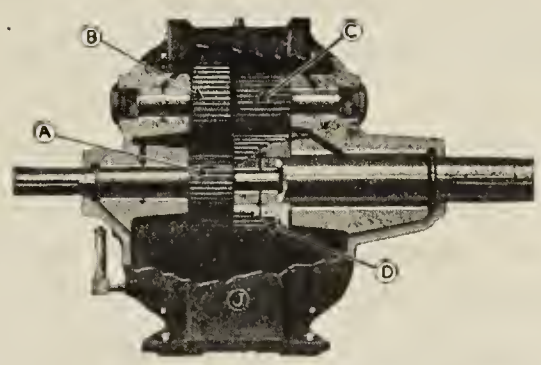
Above is shown a Jones Spur Gear Speed Reducer connected direct to the motor by flexible coupling, arranged for spur gear drive from slow speed shaft—motor speed 1200 r.p.m.; reduction ratio 20 to 1—final speed 60 r.p.m. Reductions are made by the Jones Speed Reducer in any ratio up to 200 to 1.

Jones Spur Gear Speed Reducers

are equally applicable to the needs of any industry. The mechanism is entirely enclosed, and protected from abrasive dust and corrosive fumes and acids. Factory space is economized to the utmost, the need of pulleys, belts, slide rails and other adjustments being absolutely eliminated.

The drive and driven shafts are mounted concentrically, insuring perfect balance, economical maintenance and practical elimination of power-loss.

Write today for bulletin. Our engineers are at your service.



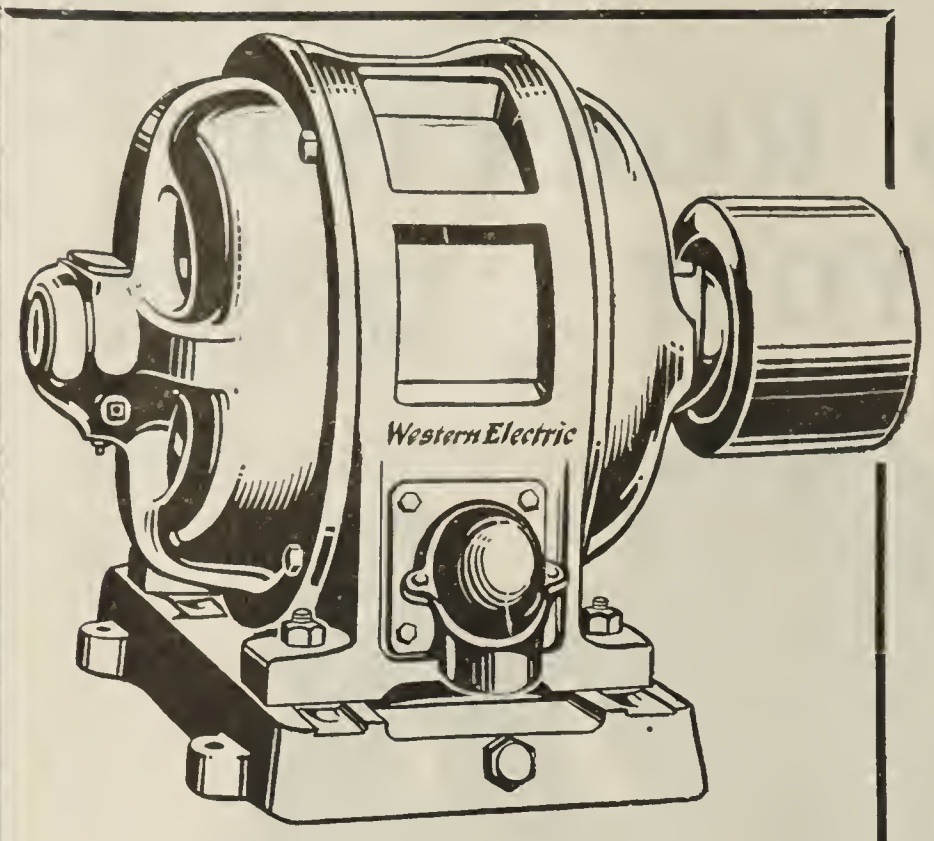
A—Pinion meshes with and drives three gears B.
B—Gears are mounted integral with the three pinions C.
C—Pinions mesh with and drive slow speed gear D.

W. A. Jones Foundry & Machine Co.

4406 West Roosevelt Road, Chicago.
New York 20 Murray St.

Manufacturers of Cast Iron Pulleys, Gears of All Kinds, Couplings, Lemley Friction Clutches, Pillow Blocks, Hangers, Speed Reducers and General Power Transmission Machinery.

J-68



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That we have spent years of our time on your electrical problems? Years of untiring efforts which embraced university training, laboratory tests on material, plant analysis, etc? We offer you today the services of men from our organization who can carry your problems through to a successful issue, can meet your emergency just the same as we met others.

We are specialists in Motor Designing, Motor Building, Coil Building and Power Surveys. The knowledge we have gleaned after making a thorough study of cement mill plants and their operation, the experience we have gained through making the cement industry our choice of operations and our factory facilities we offer you now. We know we can be of aid to you and we also know you have your electrical problems to solve.

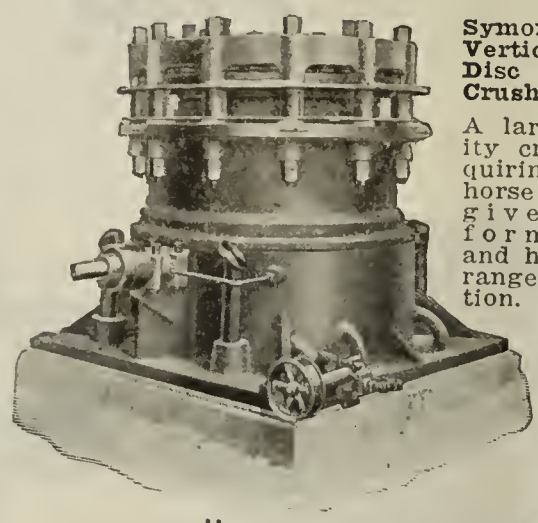
An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States.

Lansing Electric Engineering Co.

All the Name Implies

Lansing, Michigan

ROCK CRUSHERS

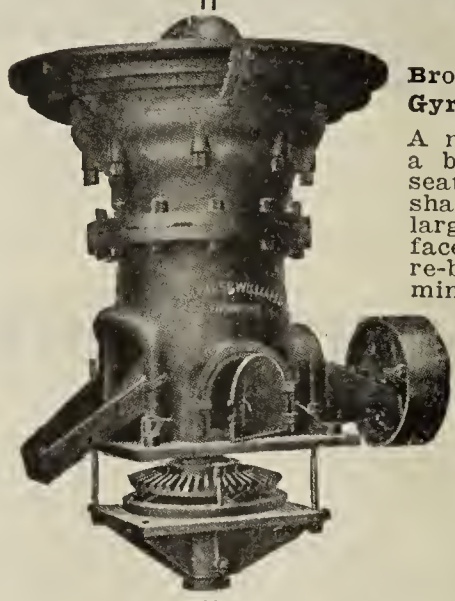


Symons Vertical Disc Crusher

A large capacity crusher requiring low horse power. It gives a uniform product and has a wide range of reduction.

The Blake Rock Breaker

A sturdy design with minimum number of wearing parts. The crushing plates can be reversed and re-used.

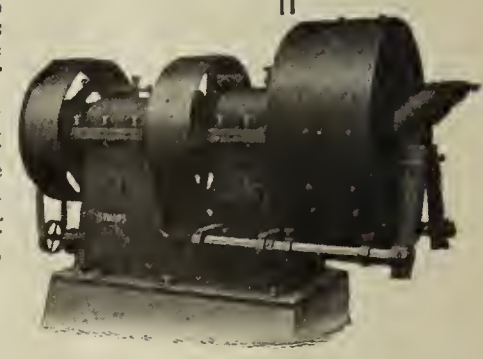


Bronze Ball Gyratory Crusher

A machine having a ball and socket seat for the main shaft to give a large bearing surface and to reduce re-babbitting to a minimum.

The Symons Disc Crusher

An improved type with revolving manganese discs which combine a rocking movement to prevent "packing" trouble when small sizes are crushed.



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Salt Lake City
307 Dooly Block

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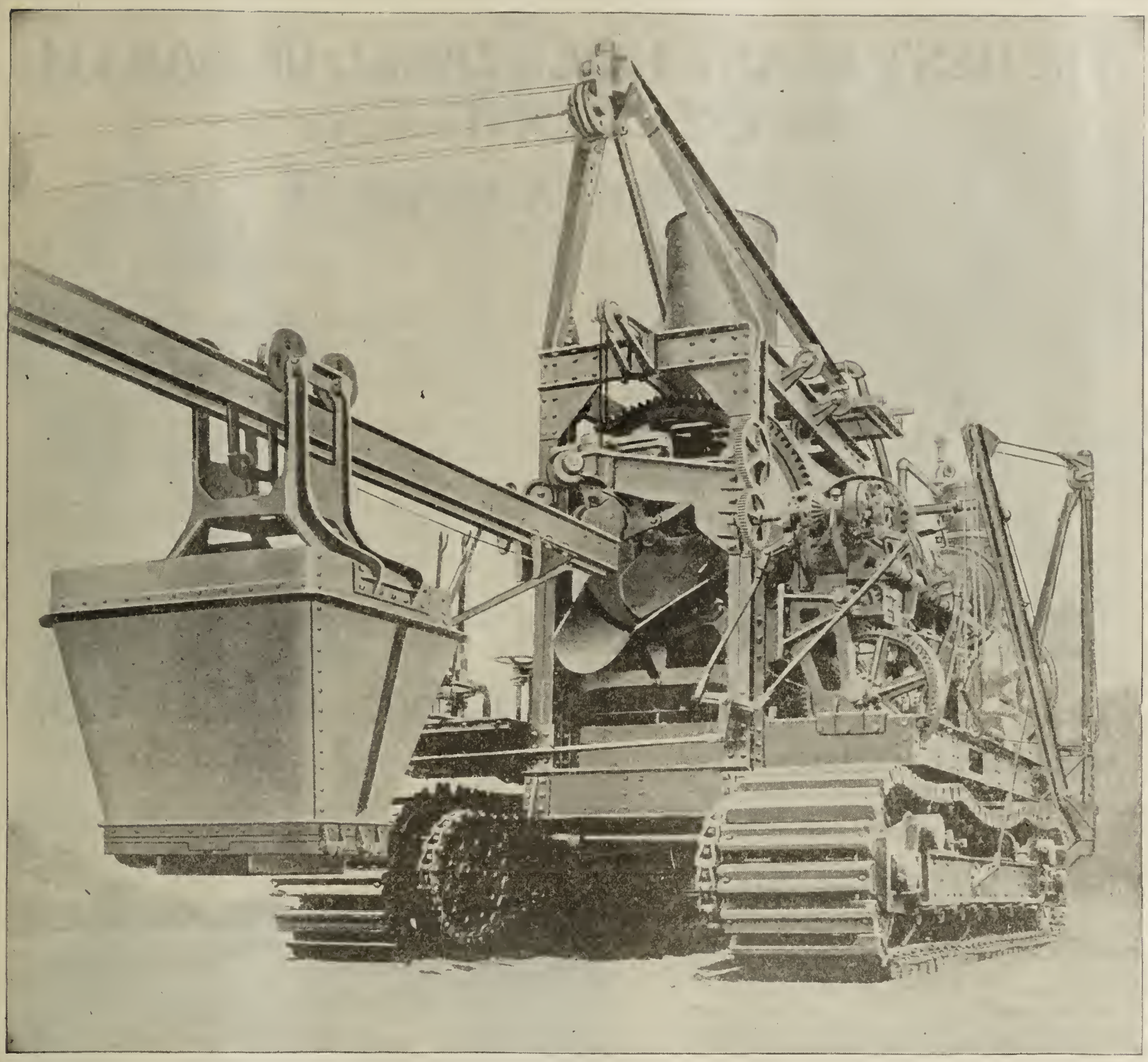


This giant full-batch bucket is what speeds up paving work

You've seen 70-cents-an-hour men idling while they waited for the second half of the concrete batch to be delivered in the bucket; of course you have.

You won't see it if you're concreting with the Austin 28E Paver with its massive "full batch" bucket; it keeps the men humping; delivers 28 cubic feet of concrete every trip.

The concrete is right too; mixed the right way; in a cube container that folds the batch over and over on itself; gives perfectly uniform mix at high speed, whether providing thinner bodied concrete or the super concrete—the difficult dry mix.

Austin Pavers have made some amazing records in rapid road construction. Why not let us send you our free booklet No. B21 about this characteristic Austin Machine.

AUSTIN MACHINERY CORPORATION

(F. C. Austin Consolidation)

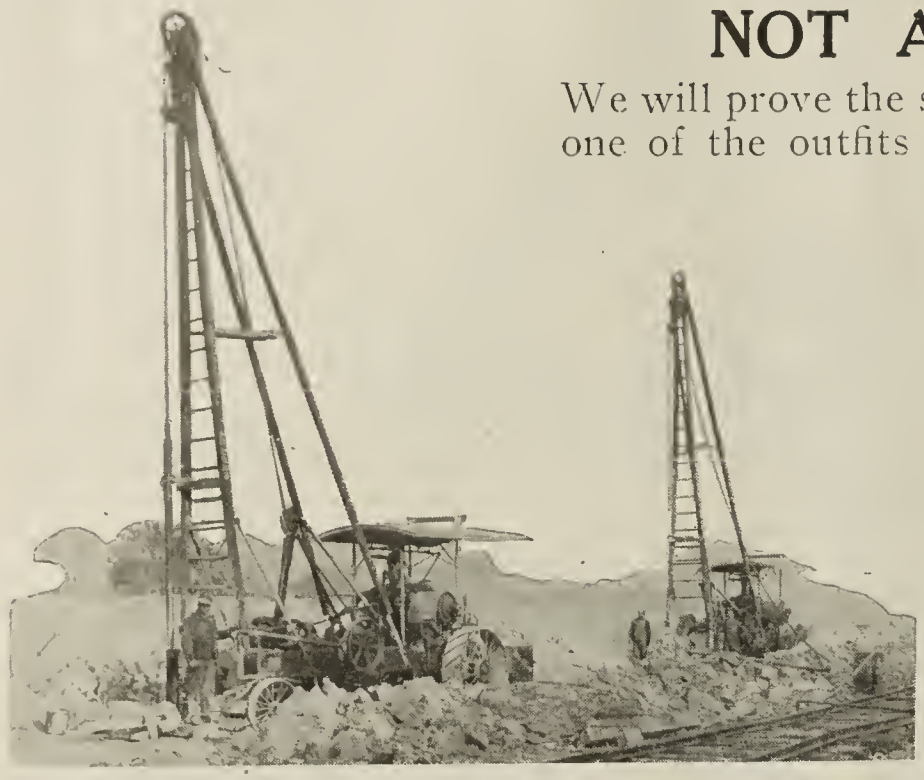
Chicago Office: Railway Exchange Bldg. New York Office: 30 Church St. Atlanta Office: 10 W. Harris St.

72 Tons of Austin Equipment on display at Good Roads Show, Coliseum, Chicago, February 9-12.

AUSTIN MACHINERY
"MOVES THE EARTH—MIXES THE CONCRETE

THE BEST BLAST-HOLE DRILL ON EARTH

THE CYCLONE No. 14



NOT A BOAST—A FACT

We will prove the superiority of the No. 14 Drill by placing one of the outfits on your work against any or all other makes.

If the Cyclone doesn't out-drill and out-wear all other drills, we will remove it from the work without cost to you.

Our proposition gets below the paint. It demonstrates what the machine will do—not what may be said about it. It puts buying on a strictly engineering basis where it belongs.

Furnished in Steam, Gasoline, Compressed Air or Electric Power, Traction or Non-Traction.

Let us send you full particulars

THE SANDERSON CYCLONE DRILL CO.

ORRVILLE, OHIO

Eastern and Export Office
30 Church St., New York

First Class Silex Slabs

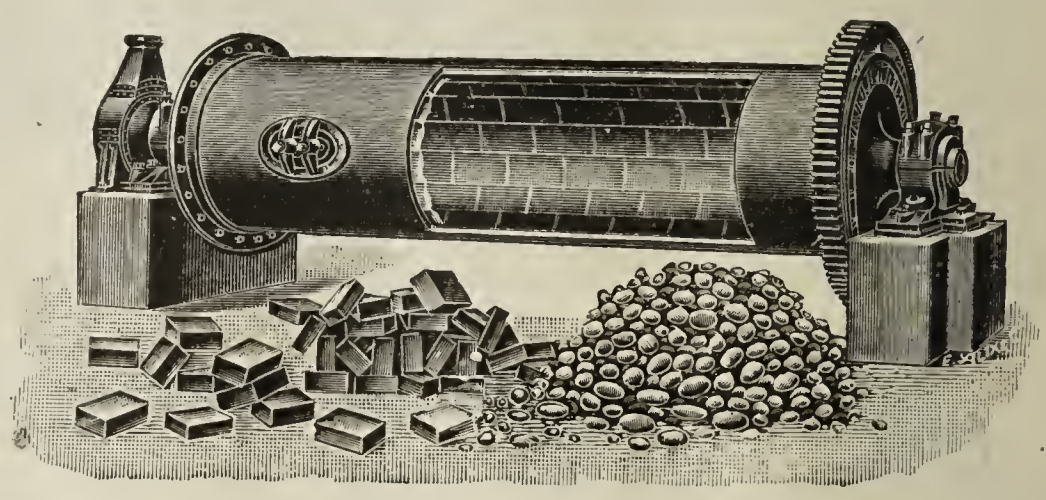
for lining of tube-mills for grinding of Cement, Clinker, Kaolin, Phosphate, Limestone, Quartz, Trap, Coal, Ores, Gypsum, Feldspar, Sand, etc.

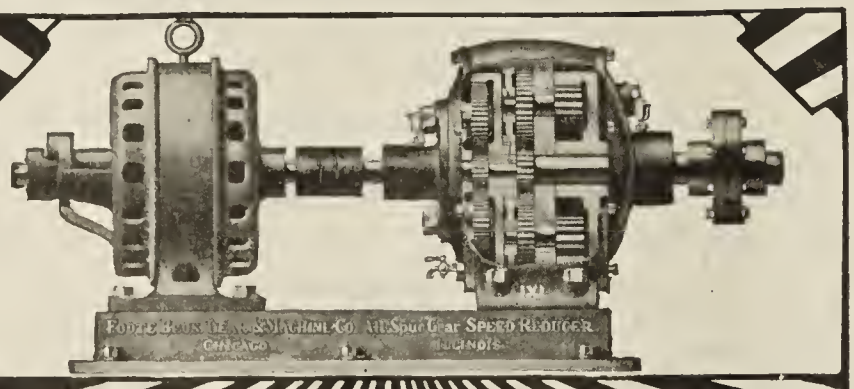
Have successfully passed some of the most severe tests. Long life and moderate price. Immediate shipment on stock sizes. Write for prices.

Societe Generale Meuliere

La-Ferte-sous-Jouarre (S-&-M)

(France)





FOOTE SPEED TRANSFORMERS

Write to us, state the conditions that exist in your plant, and get the advice of our engineering department.

FOOTE BROS. GEAR & MACHINE CO.,

228-238 N. Curtis St. Chicago, Ill.

BALLS

Forged steel balls of special analysis steel from 2″ to 15″ in dia. carried in stock. Can't be excelled.

BALL MILL PLATES
CRUSHER SHAFTS
GRIFFIN MILL SHAFTS
GRIFFIN MILL CONVEX SEATS
GRIFFIN MILL CROSSHEADS
PIPE FLANGES
For High Pressure Work
STEAM SHOVEL, TRUCK AND CAR AXLES

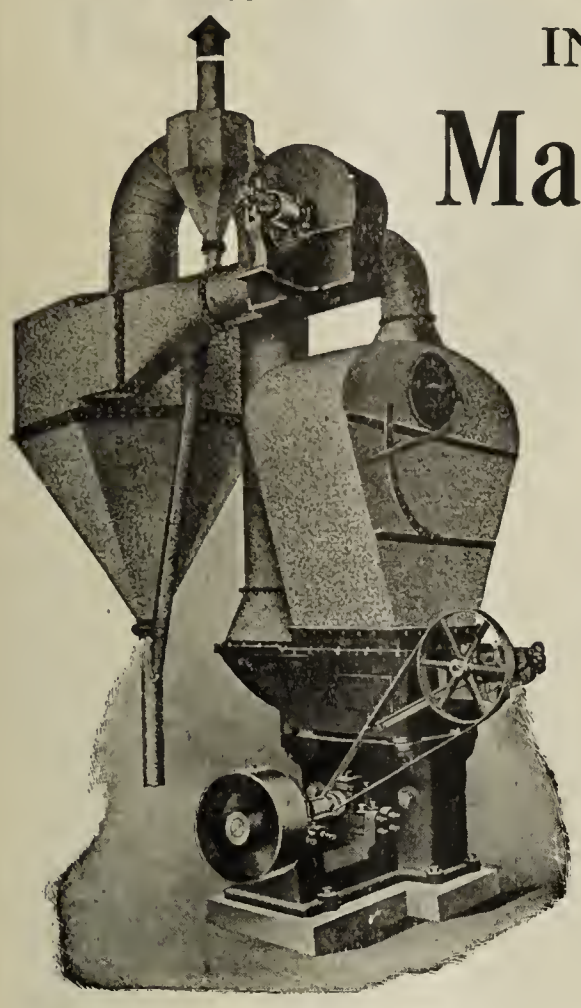
Hammer and Hydraulic Press Forgings of all Kinds

We make quick service a feature of our business

TIOGA STEEL & IRON CO.

52nd AND GRAY'S AVENUE, PHILADELPHIA, PA.

Complete Grinding IN ONE Machine



In successful use grinding Cement, Clinker, Limestone, Coal

INSTANT REGULATION OF FINENESS

NO DUST

Send for Circular

THE BONNOT CO.
CANTON, OHIO

Cut Gears

Spur, Spiral, Bevel and Worm
Steel and Rawhide

Accuracy and Prompt Delivery

When you want a gear cut you want it **quickly,**—we emphasize our promptness without sacrificing accuracy.

Ganschow Cut Gears

stand first in accuracy—perfect mesh—silent operation and the quality that counts for long service.

Estimates furnished from drawings and specifications.
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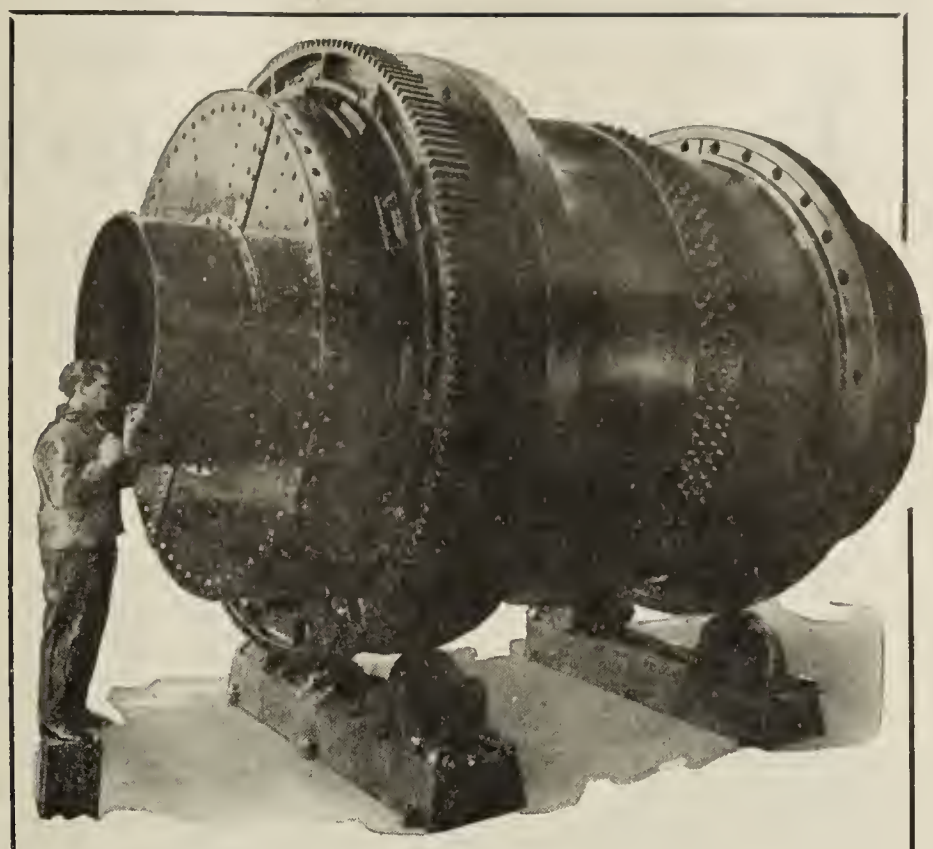
WILLIAM GANSCHOW CO.
1003 W. Washington St. - CHICAGO



Your requirements may be different from any others, but VULCAN Experience should be able to solve your problems

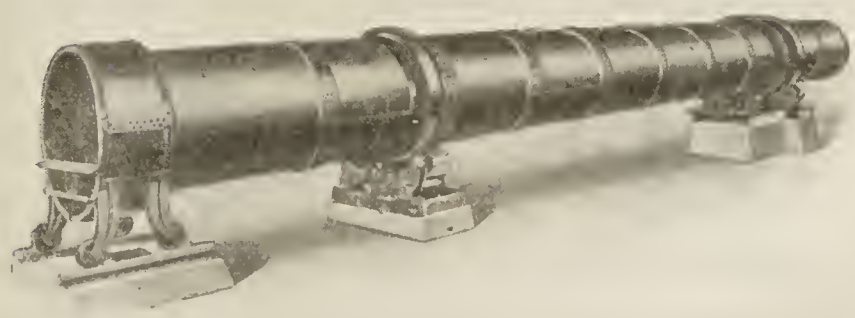
There are scores of Vulcan Kilns, Dryers, Roasters and Coolers in 29 different industries requiring 31 different processes.

Twelve kilns, dryers and colers are used by one chemical company in 6 different processes. Each set of kilns required consequent differences in design.

There are more than 1,000 Vulcan Kilns, Dryers, Roasters and Coolers in the cement industries of the United States. There are many more in foreign countries.

With such experience, dating back to the earliest of the rotary kiln manufacturers, Vulcan resources should be capable of solving your special problems.

VULCAN IRON WORKS
Established 1849
1740 Main Street Wilkes-Barre, Pa.



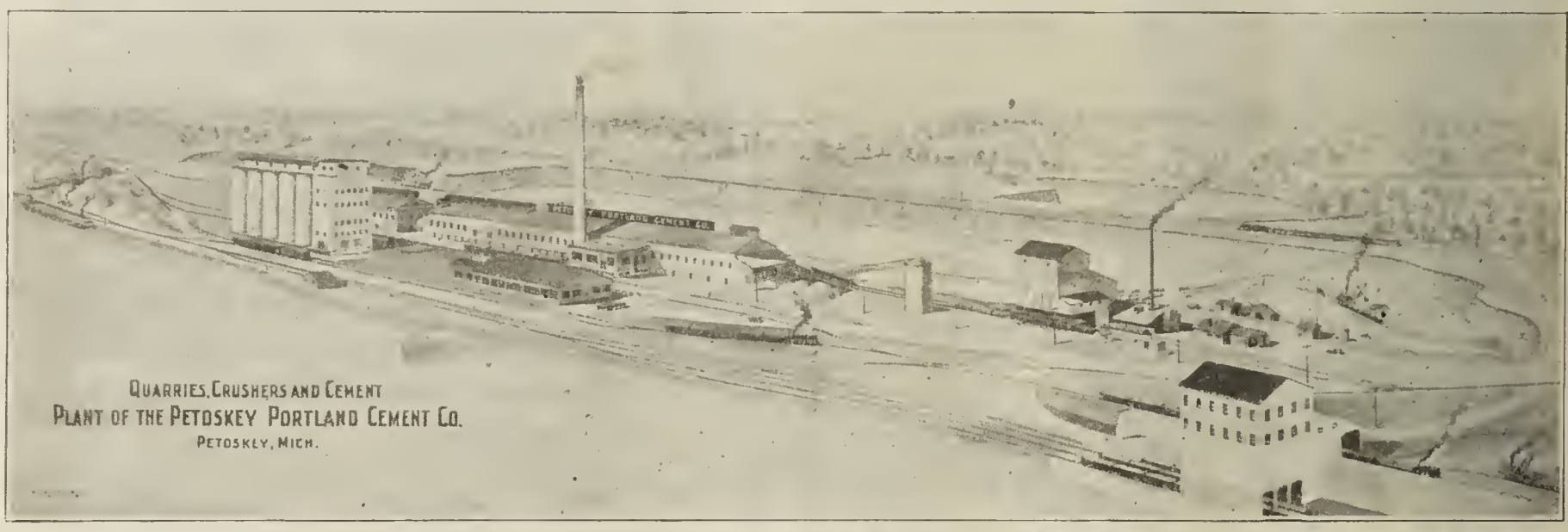
The New Plant of the

PETOSKEY PORTLAND CEMENT CO.

Designed and Built by J. C. Buckbee Co.

Is Equipped With

EDGE MOOR
WASTE HEAT BOILERS



The Waste Heat System installed at the Petoskey Portland Cement Company's plant was designed by the Edge Moor Iron Company and installed under their direction. It includes a special damper control and flue construction that they have developed, the high type of four pass Edge Moor boiler and specially constructed and arranged superheaters, economizers and fans that they have developed for this purpose. The Edge Moor Iron Company make complete installations and guarantee results. They have made installations for the following list of Companies:

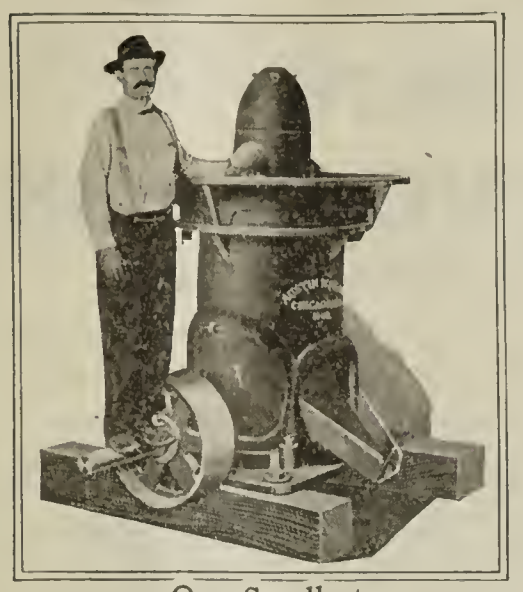
Alpha Portland Cement Company, Alsen, N. Y.
Alpha Portland Cement Company, Martins Creek, Pa.
Asano Portland Cement Company, Formosa Plant, Japan.
Asano Portland Cement Company, Kawasaki Plant No. 2, Japan.
Crescent Portland Cement Company, Wampum, Pa.
Dewey Portland Cement Company, Dewey, Okla.
Dexter Portland Cement Company, Nazareth, Pa.
Hokoku Cement Company, Japan.
Huron Portland Cement Company, Alpena, Mich.
International Portland Cement Co., Sierras Bayas, Argentine Republic.
Knickerbocker Portland Cement Company, Hudson, N. Y.
Marquette Cement Mfg. Co., La Salle, Ill.
Northwestern States Portland Cement Co., Mason City, Ia.
Petoskey Portland Cement Company, Petoskey, Mich.
Trinity Portland Cement Company, Eagleford, Texas.
Western States Portland Cement Company, Independence, Kas.

The Edge Moor Iron Company will be glad to make investigations and submit plans and proposals on request. Communications can be addressed either to Edge Moor, Del., or to the nearest Sales Office.

EDGE MOOR IRON COMPANY

EDGE MOOR DELAWARE

BRANCH OFFICES CHICAGO NEW YORK BOSTON



Our Smallest

When It Comes to Crushing Rock An Austin for Every Job

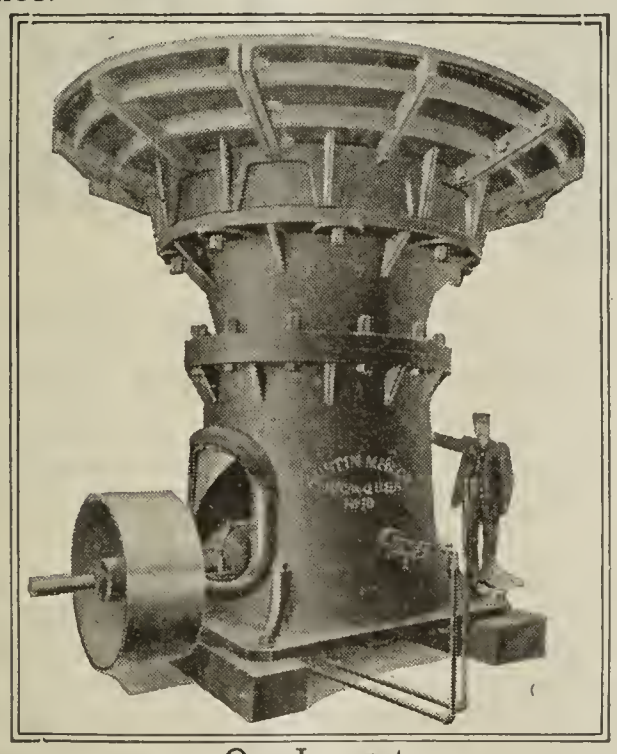
No matter what your requirements, you'll find one of the Austin Gyratory Crushers to exactly suit you.

See the two we picture here. Note the contrast in size. The big fellow dwarfs a husky man.

Eight Sizes 5 to 500 Tons Hourly Capacity

When you couple the superior operating advantages of the Austin Crushers, with the great economies effected by having a machine to turn out just as much rock as you need each hour with assurance of absolute reliability and durability—no waste power or labor—you'll understand why stone producers find Austins so satisfactory.

Catalog No. 28 describes the complete line of Austin Gyratory Crushers as well as other Austin rock equipment. Write for your copy at once.



Our Largest

Austin Manufacturing Company

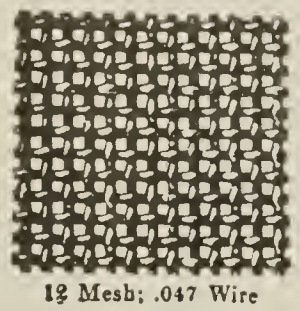
New York CHICAGO San Francisco

Canadian Agents: Mussens Limited, Montreal, Toronto, Winnipeg, Vancouver

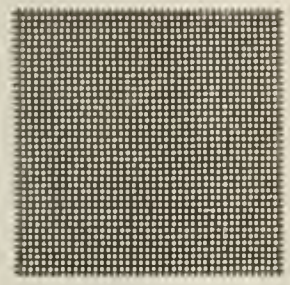
EXPORT DEPARTMENT
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA

Cleveland Double Crimped WIRE CLOTH

2½ Mesh; .105 Wire



1¢ Mesh; .047 Wire



40 Mesh. .0135 Wire

You should use our screens because a uniform fineness of screened product is assured by an even, accurate mesh. This is a characteristic of "Cleveland" Double Crimped Wire Cloth.

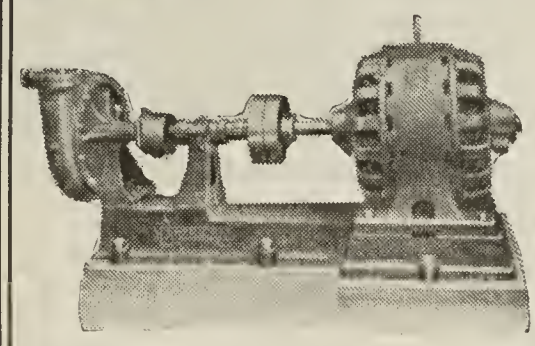
Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

The Cleveland Wire Cloth & Mfg. Co.

3579 E. 78th Street, CLEVELAND, OHIO

AMERICAN
TRADE MARK REG'D. U.S. PAT. OFFICE

PUMPS



Built to Meet All Possible Power Plant Requirements

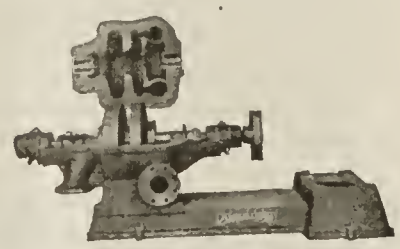
Fifty standard types of centrifugal pumps regularly built and special designs as wanted.

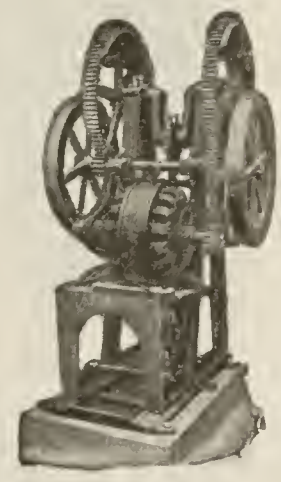
Also a complete line of deep well plunger pumps.

Write for Catalogs.

The American Well Works

General Offices and Works: Aurora, Ill.
Chicago Office: First National Bank Bldg.





BATES
VALVE BAGS
INSURE SAFE DELIVERY

If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

THE VALVE BAG CO. OF AMERICA
TOLEDO, OHIO

AJAX Belting

For the Efficient and Economical Conveying of Sand, Gravel, Crushed Stone, Cement, Clinker, and Coal

Your plant is a success, of course. You have made it such by devoting your energies to it, by carefully studying out every possible way to increase its efficiency and economy of operation. It represents and reflects your personality.

BUT—have you given to conveyor belting the attention this most necessary and important item of equipment deserves? Of course, you know that this method of conveying is universally recognized as the only up-to-the-minute, thoroughly modern way to handle cement, clinker, coal, sand, gravel and crushed stone. But do you know that, in AJAX BELTING, you can get, at a medium price, those features of flexibility and wear resistance which make them stand up under hard, continuous usage in a way which you would expect only from higher priced belts?

The reasons are evident. Fifty years experience in good belt making, proper materials and the most modern equipment are bound to give RESULTS.

Write us for: "Information On Top Notch Conveyors." It's free.

GUTTA PERCHA & RUBBER MFG. CO., 301 W. Randolph St. CHICAGO
NEW YORK BOSTON PHILADELPHIA SAN FRANCISCO

Cement and Engineering News

Vol. 33 Chicago, February, 1921 No. 2

St. Francis Bungalow Court, Finished in Cement Stucco

It is doubtful if there is another bungalow court in California that embodies as many new and novel features as the St. Francis Court which was completed about three years ago in Los Angeles.

The structure is a mixture of Mission and Colonial style, and is finished in cement Stucco. The project cost approximately $170,000 and consists of twenty four bungalows, eight of which are Chalet.

The lot on which they were built is 120 feet wide and 350 feet in length. The court extends through from Whitley to Cherokee streets, without a break. It runs parallel with, and is about 100 feet from Hollywood boulevard.

It was the purpose of the owner in building this court to produce a rental property that would afford the tenants all the conveniences and privacies of a first class bungalow. The idea of having them furnished was to accomodate the winter tourists who prefer furnished bungalows. The court is especially adapted to this purpose because of its location. It is located centrally between the beach cities and Los Angeles, enabling the tenants to reach either in a very short time, and at the same time be away from the noise and confusion.

At both Whitley and Cherokee streets, a concrete retaining wall extends across the end of each lot, leaving an entrance from each street, to the court of about fifteen feet.

At the main entrance to the court, which is on Whitley street, two large ball English box-woods are set in a concrete bowl, supported on the butress of the retaining wall.

Two concrete walk, three feet wide extend the entire length of the court. A space of about two feet wide lying between the walks and running their entire length is planted with a great variety of flowers which furnish the tenants with cut flowers.

In the center of the court is a beautiful concrete

fish pond oblong in shape, photo No. 2. Around the pond there is a concrete coping six inches high, allowing a space of eight inches between it and the pond for growing flowers of a dwarf nature. In the center of the pond is an artificial rock made of concrete with the stump of a hollow tree as a pedestal for the upper basin, which contains a large concrete mushroon setting in the center. The water spouts up through the center of the mushroon and flows over its edge into the concrete basin.

Around the fish pond a pergola about 30 feet square has been built, and supported by twelve concrete columns. Under the pergola on either side of the fountain are concrete seats.

Six concrete columns extending along the concrete center walk support electric lights, which are kept burning all night. One of these can be seen at the extreme left in photo No. 2.

The rear walk is of concrete and extends the entire length of the court along the rear of the bungalows. The rear walks have very neat concrete entrances from the street, a series of electric lights extend the length of the rear walks, illuminating the rear of the bungalows all night, thus protecting the tenants from night prowlers.

Eight of the twenty-four bungalows are built on the Chalet style. These are grouped at the center of the court and are shown in photo No. 3. Each Chalet has a beautiful concrete covered porch. All the bungalows are furnished, there being a living-room, dining-room, kitchen, bath-room, bed room and dressing room, and rear porch. The eight Chalets have in addition to this a large bed-room upstairs.

Growing Demand for Concrete Staves for Buildings for Storing Corn, Coal, Sand, Etc.

While the concrete stave silo industry is of comparatively recent development there are at present manufacturers in 26 states and these states contain by far the majority of the beef and dairy cows of the country. There were probably 20,000 concrete stave silos erected in the 1920 season by the 215 or more builders engaged in this line of work. The output per manufacturer runs from a few silos each upward to several hundred. The Michigan Silo Co., with factories at Kalamazoo, Mich., and Peoria, Ill., probably established a record for quantity output for one year when it completed 900 jobs in 1920. Of this number, between 850 and 860 were new silos, about 30 were extensions on old silos and the balance consisted of water supply tanks and grain bins. Considering transportation difficulties and building material shortages, the record is one which other manufacturers may find difficult to surpass.

Almost since its introduction the concrete stave silo has been popular with the farmer. The following instance is typical of the manner in which silos of the concrete stave type hold their own in the field with silos of other makes. Messrs. Gray and Russel of the Anamosa Cement _Stave Silo Co., Anamosa, Ia., built 61 silos in the course of the 1920 season. Thirty per cent of this number were erected on farms that already possessed one or more of their silos; 16 per cent on farms having silos of other materials and the remainder were erected on farms that previously had no silos. In no instance was a silo of any other type placed on a farm where a concrete stave silo had been built by Gray and Russel.

No subjects aroused more interest at the recent convention of the concrete stave manufacturers in Chicago than did the talks describing the use of concrete staves for structures other than silos such as corncribs, granaries, coal pockets and grain tanks. The discussion on corncribs and farm elevators was led by C. F. Breeden of the Newcomer-Breeden Construction Co., Marshalltown, Iowa. Mr. Breeden has designed and supervised the construction of a number of excellent farm elevators for the storage of ear corn and small grain. A special stave is used in building the walls of the corncrib. It differs from the silo stave in that it contains 2 openings each 4 in. wide and 9 in. long to permit air to enter the crib and dry out the corn. Each stave is reinforced with 4 quarter-inch rods which are embedded in the stave in such a manner that the rods pass through both openings provided for ventilation thus forming a grating for excluding rats. Storage bins for grain were built with the ordinary silo stave, great care being taken to get an impervious wall. Practically all of the farm elevators built by Mr. Breeden were circular and consisted of 2 circular or 2 semi-circular structures with a driveway between. In a number of installations bins for small grain were built directly over the driveway. The demand for permanent storages for grain and corn on the farm seem unlimited. One Illinois firm handling concrete stave corncribs for the first time in 1920 did a $75,000 business.

The talk on concrete coal pockets by E. N. Heim of the Heim Construction Co., North Liberty, Ind., brought out a number of new developments in the design and construction of coal pockets. Most of the coal pockets which have been built up to the present have been made of the regular silo stave. As the staves in a pocket are subjected to more severe usage than staves in a silo, Mr. Heim urged that only staves of the very best quality be used for this purpose, and he was of the opinion that the stave thickness should be increased from 2½ in. to 3 in. so as to minimize the danger of staves getting cracked when large lumps of coal roll down against them, as often happens when the pocket is being filled or emptied. It is around the opening provided for drawing coal out of the pocket by gravity and loading of the wagons or trucks for delivery that the staves receive the hardest wear from the moving coal.

Keep Your Eye On the Greatness of the Nation

Conditions at the present time, even though they are disquieting and distressing, do not justify the extreme spirit of pessimism that seems to pervade some sections of our country.

This old world keeps on turning over regularly and daylight follows darkness, and who knows but that the beclouded present may soon become the sunshiny tomorrow that all are hoping for and some believe is only a short way ahead.

All of which indirectly suggests that the man who goes ahead with an abiding faith in the future is the one who progresses, and it is the one that stops who soon falls behind the procession, for the world about is going on.

You say, "What's the use?" Well, naturally, we prefer bustling good times, but a red-blooded American never has backed away from an uphill pull just because it looked steep, and never will.

Throw off your pessimism! Look for the bright side of things! You can't help yourself by grumbling or worrying, and besides you'll sleep better. Ever try it?

The United States is so rich in money and natural resources that it is the envy of every nation in the world. Superlatives fail to visualize its greatness, and yet we hesitate!

Let's go!

Building Monolithic Silo in Three Days

For a number of years Moore Bros., West Plains, Mo., have been building monolithic concrete silos in large numbers. The work is all done with a Van Guilder special wall machine, curved to build silos of various diameters. That they have built self-supporting concrete walls 10 feet high in a single day is remarkable, and is due to careful study of the exact mix and consistency to produce the best results. They write:

We did a little extra fast building last week. We built the wall of a 12x31½ foot silo, above the foundation, in three days with five men.

How the Silos are Built

We generally dig the pit 4 feet deep to make it large enough to set the wall machine right in the bottom. We open the machine 10 inches wide for the first three courses, then reduce the thickness to 8 inches and 6 inches, as required. It generally takes three men two days to dig the pit. We generally use six men to build a 16 foot silo and 5 men to build a 12 foot silo. We use a Kent continuous mixer, and do the hoisting by hand—have never found anything to beat a good man. It takes about 50 bbls. of cement to build a 16x40 foot silo and about 40 wagon loads of sand and gravel.

We plaster our silo on the inside with an extra fine finish. It is not customary to put roofs on in this country. Only two silos have been roofed of over 200 we have built. For reinforcing we use the heaviest barbed wire we can buy, and set it every 9 inches. We place old wagon tires over and under each door. Our staging is built of 2x4's and 1x6 ledgers, with 10 inch boards 8 feet long, with ends rounded off so they will lay close to the wall. We floor this every 6 feet as we go up.

The secret of fast building is largely in the mixing of the concrete. When very fast work is desired, we put enough smooth sand in the mix to make it act somewhat like putty under the tamper. We use 3 sand, 4 sharp gravel or crushed rock, all through 1 inch mesh screen.

Now, to make it work fast you must have everything warm; if you can get the water out of shallow ponds in warm weather, it will do, but we heat all water if it is the least bit cool. You want to wet the concrete just enough so when you get it tamped in the form, by doing a little extra tamping the water will show on top. Experience is the best way to learn how to make "mud" just right.

Opportunity for Building Operations

Mr. B. Miflin Hood, president of the B. Miflin Hood Brick Co., of Atlanta, Ga., in a letter to the Cement & Engineering News, gives an illustration of the spirit which should prevail and the methods which should be adopted wherever possible. Writing in regard to the business situation he says:

"We are still running all our plants, selling all that we can, and piling up some surplus, as we are hopeful that there will be a demand next spring in excess of our ability to manufacture. We are prepared to shrink profits, and would rather run and break even than to shut down, leaving worthy and loyal labor unemployed. And, again, we feel that the South is underhoused in home and business."

Not only is the South short on dwellings and business houses, but the whole country is tremendously short. Economic conditions will absolutely force the renewal of building operations, and wherever it is feasible to keep plants running and labor employed we believe that it is wise that it should be done. It is the duty of every business house to keep its labor fully employed if possible. There must be no excuse given to labor to become dissatisfied and antagonistic to the business interests of the country. Employers are doing themselves and the nation a service, as well as helping humanity, when they keep their men as fully employed as possible, and at living wages.

Some wages have been too high. Some laborers have been unduly exacting in their demands. Some labor has been inefficient. But these conditions are all the natural outcome of the turmoil which has followed the World War. The way to overcome this situation, we believe, is not by shutting down plants and lessening wages, but by keeping in close touch with the men and doing the very best to pay them a living wage and to show them that employers are doing all in their power to maintain wages and employment. Any effort to break down wages, except in the case of the exorbitant and unjustified demands which are sometimes seen, would be most unwise from every point of view. Every laborer should be made to feel that every employer has the laborer's welfare at heart and will do the utmost to maintain wages profitable to the men during this time of readjustment.

New Concrete Buildings for United Drug Co.

What is said to be the largest factory of its kind in the world is now under construction in St. Louis, Mo., for the United Drug Company.

This plant is to consist of five buildings having an erea of 14½ acres, and a total floor area of 600,000 sq. ft. It will be used for manufacturing drugs and candies.

Work on this undertaking was begun during the summer of 1920. The general contractor is the Westlake Construction Company, of St. Louis. The Harry M. Hope Engineering Company, of Boston, designed the entire structure and this company also has supervision of construction.

This group of buildings is of reinforced concrete, flat slab construction. The work requires 45,000 cu. yds. of concrete, 2,000 tons of reinforcing steel and 16 carloads of steel sash.

The vast amount of concrete for this structure has been placed from four 180-ft. steel towers, each tower supplying an area of about 20,000 sq. ft. This material has been hoisted by means of 1-yard. buckets, four doubledrum engines, and Leschen Plow Steel Wire Rope. It is said that 350 yds. of concrete could be hoisted in any of the towers in one day.

This manufacturing plant is interesting not alone because of its size, but also because of its design. It is typically modern in every respect, and contains a hospital, rest rooms, cafeteria and roof garden.

The location of this plant is in St. Louis' new industrial district, which is on the northwest side of the city. At the present time there are numerous manufacturing plants under construction in this locality. The recently completed plant of the General Motors Corporation, is also in this district and the Leschen Wire Rope Co's. plant is adjacent. This is an exceptionally good manufarturing district because of shipping facilities.

A near view of distributing system. Each tower supplies an area of about 20,000 sq. ft.

This building is of reinforced concrete, flat slat construction

Pennsylvania's Challenge to Road Builders

Eighty-seven feet of completed high-grade concrete road, eighteen feet wide, in forty minutes—at the rate of about a mile in five days—this is the remarkable speed recently achieved on Pennsylvania roads with a 28-E Austin Paver, the largest all-multipedal paving machine made. Will the next report have superintendents holding stop-watches on their crews?

What the Gibbs Company Did to Increase Its Business

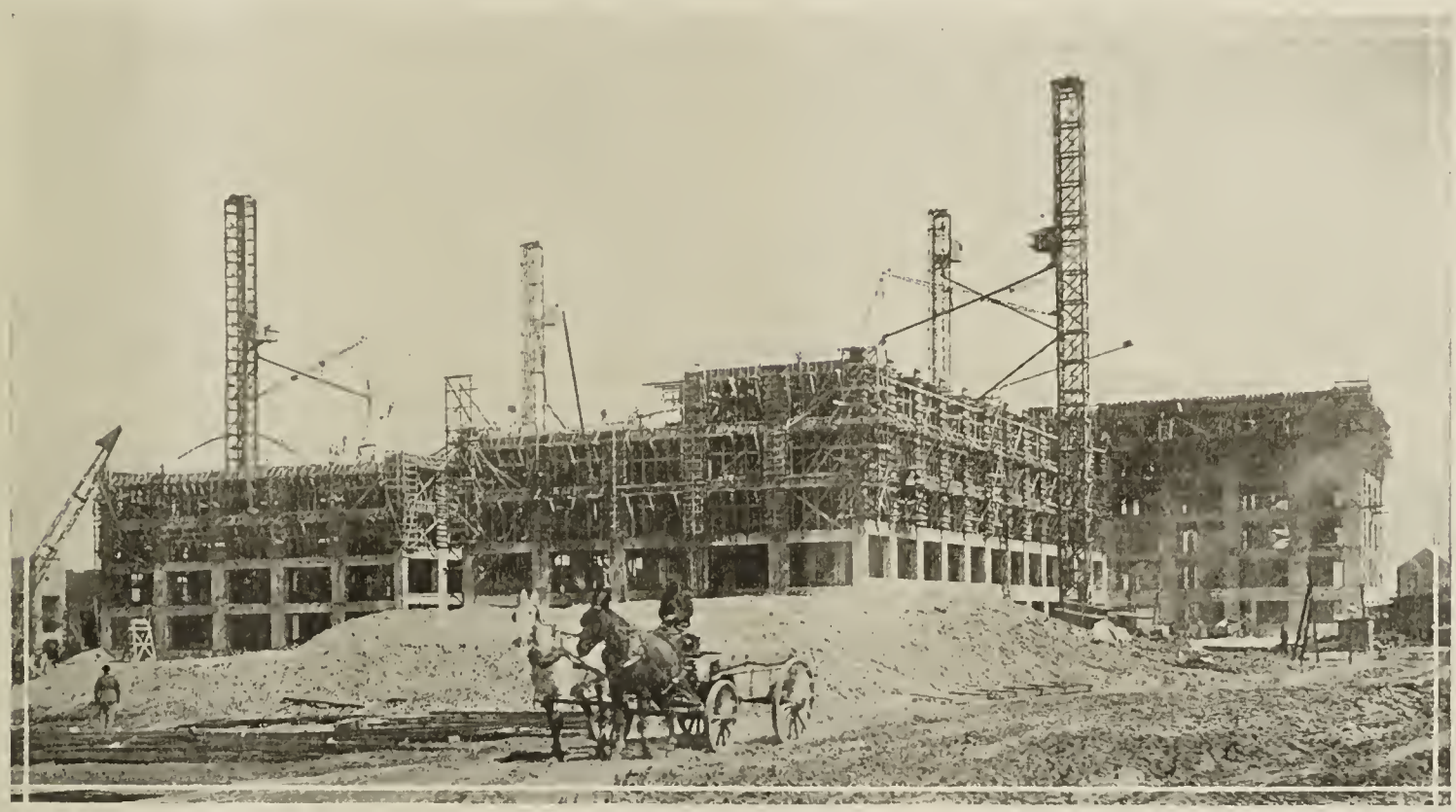
The F. W. Gibbs Contracting Co. is known to every inhabitant of Montclair, N. J. A combination of good workmanship and simple but effective advertising has resulted in an enormously increasing business for this concern. In talking with Mr. Etzel, president of this firm, he remarked: "Every contractor should choose a distinctive combination of colors and paint everything he uses with these colors. Each piece of apparatus that is large enough should have the name of the concern painted upon it, and always painted in the same colors and style of lettering. Every contractor's wagons, trucks, job shanties, mixers, tool boxes, water barrels, wheelbarrows, shovel and pick handles, lanterns, etc. should be distinctively his by the combination of colors. It will not take the public long to recognize these and the result will be that everywhere they are seen, they will be recognized as belonging to that particular contractor. It is one of the cheapest and best forms of advertising. It also has a marked effect on cutting down the losses of wheelbarrows, shovels, lanterns, etc., for one will hesitate to steal an article so distinctly marked, and if they are stolen identification is easy."

When a job is started by the F. W. Gibbs Contracting Co. a cart load of necessary material is sent to the job, hauling in the back the tool box to the rear of which is fastened the mixer. On the front of the tool box there is a hose reel which is manufactured by the Specialty Manufacturing Co., St. Anthony's Park, Minn. This reel is so made that the hose can be fastened to the hydrant and as much unreeled as is necessary to reach the work without detaching it from the reel. With this rig the workmen are forced to wind up the hose on the reel when the work is finished rather than coil it up and throw it into the tool box, where it is sure to be injured, by heavy tools. This rig is said to cut down the cost of hose about 60 per cent.

Mr. Etzel found that small, seven cubic foot capacity Jaeger mixers are most economical for the work which he is handling. Mr. Etzel figures that each mixer above all costs, brings them a profit of about $3.50 a day when running. This is brought about by the elimination of one man in the gang and the saving of cement which was formerly lost in mixing on a mixing board or on a rough pavement. Machine mixing also allows the execution of larger work than would be possible with hand mixing.

Montclair is essentially a town of homes, most of whose occupants commute to New York. There is therefore a great variety of construction work. An old steel water tower in Montclair has been strengthened with concrete recently by this concern. Wire was wound around the structural steel. The forms were made in the carpenter shop and assembled on the job.

A "specialty" of this concern that has developed considerable business this past season is the "Side-Hill" garages.



The four steel towers from which concrete was distributed

Motclair is situated in a hilly section and many of the building lots have a steep slope. The "side hill garage" has been the solution of the private garage for Montclair. This "Specialty Garage" has been a big thing for this firm this past season.

Each contractor will find in his town some peculiar use for concrete such as the F. W. Gibbs Contracting Co. has done in Montclair. The various cement companies will help you on design, and a letter addressed to the Technical Department of any cement company will always bring results. A cement company supplied the details of side hill construction to the F. W. Gibbs Contracting Co.

Concrete Road Building

"National Handbook," issued by the National Steel Fabric Co., First National Bank Bldg., Pittsburgh, Pa., contains, in addition to descriptions and illustrations of National road fabric and curb (bar) reinforcement, numerous tables and other data of interest and value to the designers and builders of highways. This little pocket manual has been prepared, it is stated, with the idea of extending service to engineers and contractors interested in the construction of concrete roads, streets, etc. It is thoroughly entertaining, and instructively illustrated.

A Half a Century of Progress

The B. F. Goodrich Rubber Company, pioneer manufacturer of mechanical rubber goods and other rubber products, is now entering upon the second half of a century of progress. The first half of the century was completed December 31, the company having been incorporated December 31, 1870, by Dr. Benjamin Franklin Goodrich.

Inasmuch as the growth of Akron during the last two decades has resulted directly from the expansion of the rubber industry, the anniversary had real significance to the people of the city. The industry literally made Akron, lifted it out of obscurity and placed it on a plane with the foremost manufacturing centers in the country. Consequently the people of Akron feel duly grateful to Dr. Goodrich, the man who brought the industry to the city.

Dr. Goodrich, who was a physician by profession, entered the rubber business as result of having acquired a rubber factory at Hastings-on-the-Hudson in a real estate deal. Seeking financial help, he was attracted to Akron where a group of progressive citizens promised to back him. He began manufacturing in a small, two-story brick building with a force of 25 employees. This small factory has grown until today it comprises 63 giant buildings covering 110 acres of ground.

When Dr. Goodrich built his factory in Akron, the field for the use of rubber products was limited. It was just beginning to be appreciated as a factor of industrial life. There is now scarcely an industry that does not use rubber products of some kind. Rubber has silently woven itself into the very fabric of modern life. Wherever men work—whether they are forging rails, girders or dreadnaught armour, or weaving the daintiest fabrics—rubber in a thousand forms is their help and mainstay.

Dr. Goodrich, who had sincere faith in the future of the rubber industry, was looked upon as a visionary—and so he was, but above all he was a worker, striving to make his vision a reality. When folk joked about his "smelly little shop on the canal," he never let down in his efforts. "Let us make goods destined for service," was the simple principle he often voiced.

The first article produced was rubber hose. Dr. Goodrich once saw a friend's home burn down because a defective hose burst when the firemen turned on the pressure. He determined then and there that he would some day devise a hose that would stand up under pressure and when he came to Akron he straightway began to put his determination into effect. He succeeded—and Goodrich is still making hose—miles of it, for use in every land under the sun and for every purpose.

It is related that one time when Dr. Goodrich was trying to find a market for his gods, he tried to sell rubber hose to the fire department of Cincinnati, which still used leather hose. The firemen scoffed at Dr. Goodrich's contention that rubber hose would be much superior to the leather, and refused to buy. It wasn't many years, however, before Dr. Goodrich had the laugh on them for rubber hose soon came in universal use.

After starting with the manufacture of hose, Goodrich added article after article to its line of manufactured goods until today approximately 30,000 different rubber products are made, filling an almost infinite variety of needs. They can be classified into five general divisions, each ramify into numerous subdivisions: mechanical goods, rubber footwear druggists sundries, hard rubber products, and tires—both pneumatic and solid.

The manufacture of automobile tires followed naturally from Goodrich's early experiments in perfecting rubber shod wheels. Solid rubber tires for carriages were made first. Then came the pneumatic tires for bicycles, made in large numbers when the "bike craze" swept over the country. Auto tires came next, the same fundamental principles being used in their construction as for bicycle tires. With the universal use of the motor car today, it is difficult to realize that a short time ago as 1896 Goodrich produced the first American clincher type tires for automobiles.

In the golden anniversary greeting to employees and thousands of customers throughout the country, President B. G. Work said in part: "We feel a thrill of pride as we look back over the years and realize the part we have played in the development of the rubber industry".

The Goodrich company commemorated the golden anniversary by publishing an attractive 48-page book called the "Golden Year of Goodrich" telling of the romance of the rubber industry, its history, and of what great importance it has been in the progress and development of the world. The book was written by Wilbur D. Nesbit and illustrated by W. T. Benda, the famous Polish-American painter.

Largest Arch in the World in Minneapolis

The largest concrete arch in the world—400 feet long—is under construction here. It is one of the five arches which will span the Mississippi river at Franklin avenue.

The arch, which is made of reinforced concrete, surpasses by 46 feet a similar one in Rome, which was declared the largest in existence.

On either side of the huge span, will be a 200-foot concrete arch, with a 55½ foot one at the extremities of the bridge.

The bridge, which is 56 feet wide, will not be completed until the summer of 1922, in the opinion of K. Oustad, general superintendent of bridge construction. It will cost approximately $600,000, he estimated.

Because of the immense weight of the huge middle arch, it is necessary to build a portion on the middle and adjoining spans at the same time, Mr. Oustad said, so that there will be a supporting force against the reaction of the middle span.

Crushes and Pulverizes

The Gruendler Patent Crusher & Pulverizer Co., 904 N. Main street, St. Louis, Mo., have published a large illustrated folder descriptive of their products. Several illustrations show the machines, of which it is said that they will increase production, practically eliminate repairs, prevent loss of time, save from 30 to 40 per cent of power consumption and 90 per cent of lubrication. Design is simple and parts are durable. They will, it is further stated, grind or pulverize to any fineness any material in one operation, handling limestone or phosphate stone just as easily as fish scrap, tankage, guano or other soft materials. Several testimonials are presented on a separate sheet showing the value of these machines for a variety of uses.

Concrete Roofing Tile

By L. Hansen.*

More and more architects and home builders are realizing that a roof should be decorative as well as durable. The production of ornamental roofing materials, having fire-proof qualities, has been steadily increasing in the past few years.

Abroad, the use of tile has far out-distanced that of other forms of roofing material and is rapidly taking a foremost place in this country, especially of concrete roofing tile.

Opportunity is waiting for the energetic, progressive business man, with vision, in every live community to manufacture concrete roofing tile.

A green tile roof adds character, so does a red or a brown roof, to any residence.

Then again, can you or anyone else name another ornamental roofing that is durable and fire-safe? The field for these tile is unlimited. Will you avail yourself of this opportunity, or will you let someother enterprising man grasp it. I personally have manufactured, sold and applied thousands of roofs and I know it can be done and I know there is a great demand for concrete roofing tile anywhere in the United States.

This cut shows how Spanish Tile looks when laid on roof

The U. S. Champion Line of Concrete Roof Tile Machines manufactured by L. Hansen Co., 3617 E. 23rd street, Kansas City, Mo., includes two different types of machines of which one is for making tile of the French design, and the other for making the famous S-shaped Spanish tile.

Through the more than 25 years in which we have made these machines, they have been steadily improved upon by us and have now the most modern mechanical features, of which one is for making an interlock on top of the upper end of the tile, which as a water and wind stop, prevents rain, dust etc., from blowing in between the tile—even in the severest storms. These improvements are fully protected by patents in the United States and elsewhere. No other tile machines have them.

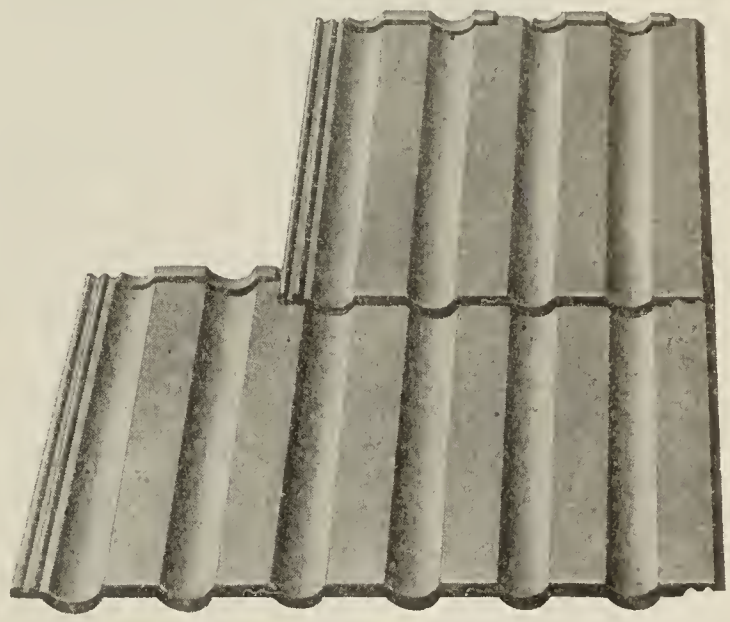
Please investigate both of our tile having our newly invented water and wind-stop, which is made automatically by our machines at the same time the tiles are made. These tiles are a perfection in practical style, durability and beauty.

Our tiles are given every possible test and trial by highly experienced roofers before being placed on the market. We know how the tile should be made to give full satisfaction, and we build our tile machines capable to turn out these highly durable and artistic roof tiles with unparalelled rapidity. All of this experience is at your disposal whether you buy or not.

When you buy machinery for entering the roofing tile business, buy it by the pound of capacity and service. Our machines have an incomparable capacity. They do more work and better work in less time and with less effort than any other tile machine in existence.

An Unusually Complete Catalog of Concrete Machinery

General catalog No. 28, issued by the Ideal Concrete Machinery Company, 1318 Monument Ave., Cincinnati, Ohio, covers the subject of concrete machinery most thoroughly. Not only is the catalog beautifully gotten up, but the various lines are treated in such details as to make it extremely valuable to anyone interested in any way in concrete.



French design concrete roofing tile

The Ideal Concrete Machinery Co., are specialists in the manufacture of concrete block machines for making blocks of practically any description and for almost every purpose, from foundations for the smallest buildings to silos, ornate decorations and the like. The catalog shows a very complete line of moulds and forms of every discription including some extremely artistic classic designs of columns, pedestals, capitals, mouldings, etc.

The catalog not only illustrates all of the necessary machinery for manufacturing a complete line of high grade products but it also supplies the concrete products manufacturer with the necessary information to turn out high quality work. The Ideal Concrete Machinery Co. is, therefore, anxious to get this catalog into the hands of everyone actually engaged in the manufacture of high grade concrete products and to all such they advise us that they will send the catalog free on request.

Large Concrete Grain Elevator

There has recently been completed at Canton, Maryland, on the Baltimore waterfront, a modern reinforced concrete grain elevator for the Pennsylvania Railroad, that is ahead of the times.

This Northern Central elevator, as it is called, is the largest on the Atlantic Coast, but its size is by no means its sole claim to fame.

The purpose of this structure is for storing grain awaiting vessels and for transferring grain from cars to ships. Its ultimate capacity is 5,000,000 bushels.

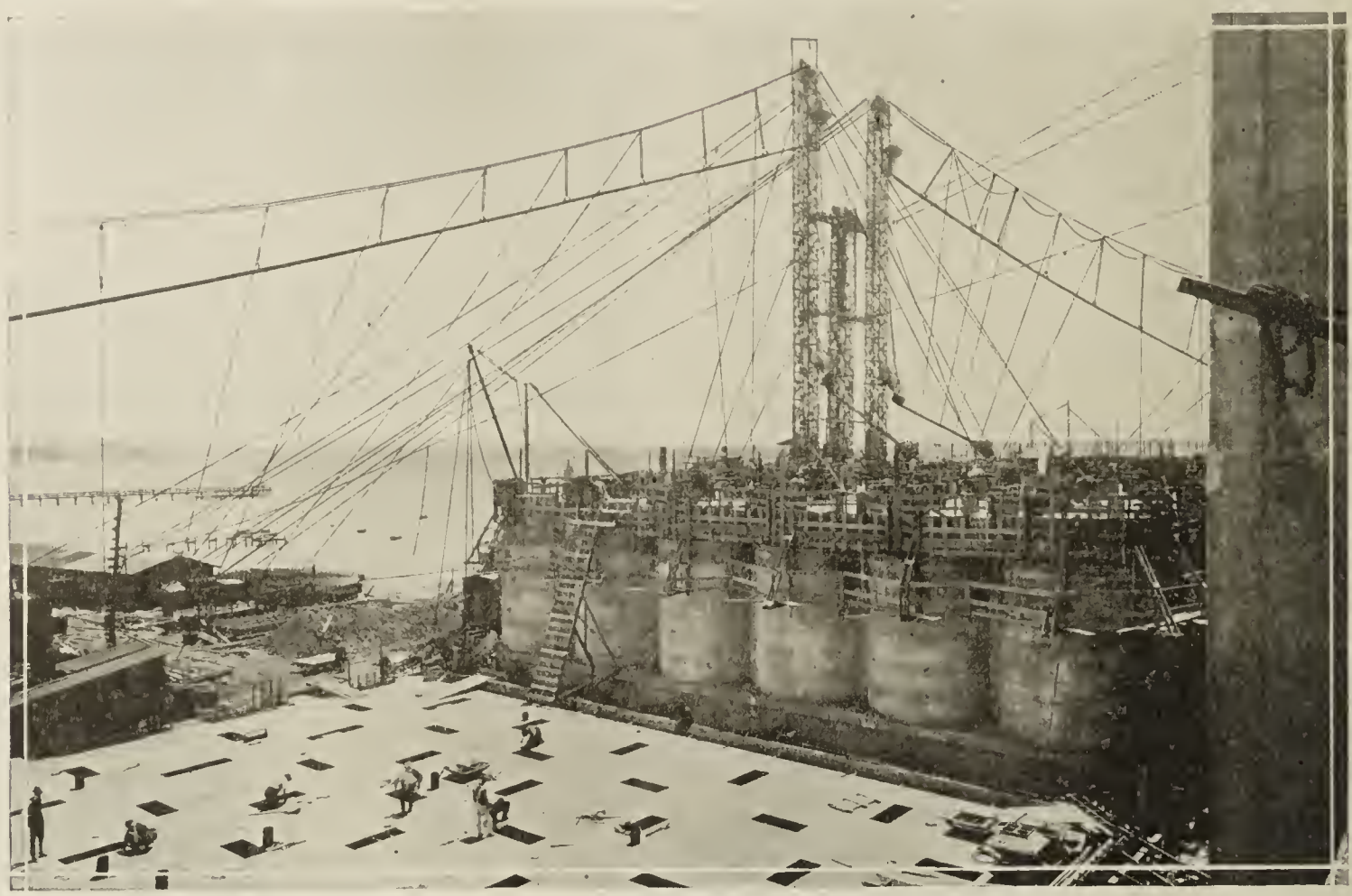
Grain dust, as has been demonstrated, is dangerous, as it explodes. One of the first considerations, therefore, in designing this plant, was to provide maximum safety.

The elevator or storage section of this structure is built almost entirely of concrete, and constructed so as to reduce lodging places for dust to a minimum. To make assurance doubly sure, the plant is equipped with a telephone fire alarm system, with direct connection so that when the fire signal is called the fire fighting forces are immediately set into action.

While there are many interesting features in connection with the construction of this elevator, our space limits us to a brief description of the most striking methods of its operation.

The most spectacular equipment is the four Stewart link-belt car unloaders. These huge mechanical devices pick up a car loaded with grain and have it unloaded in the short time of seven minutes.

After a car is run upon one of these unloaders a motor is started which sets the clamps that hold the car in place. The unloader then tips the car sideways to an angle of 30 degrees, and endways to an angle of 45 degrees, if necessary. While this is being done the car door is being mechanically opened and the grain rushes out into a receiving hopper. It can be tipped



Placing concrete for the storage bins. Each of these circular bins holds 13,000 bushels of grain

A general view of the Northern Central Elevator

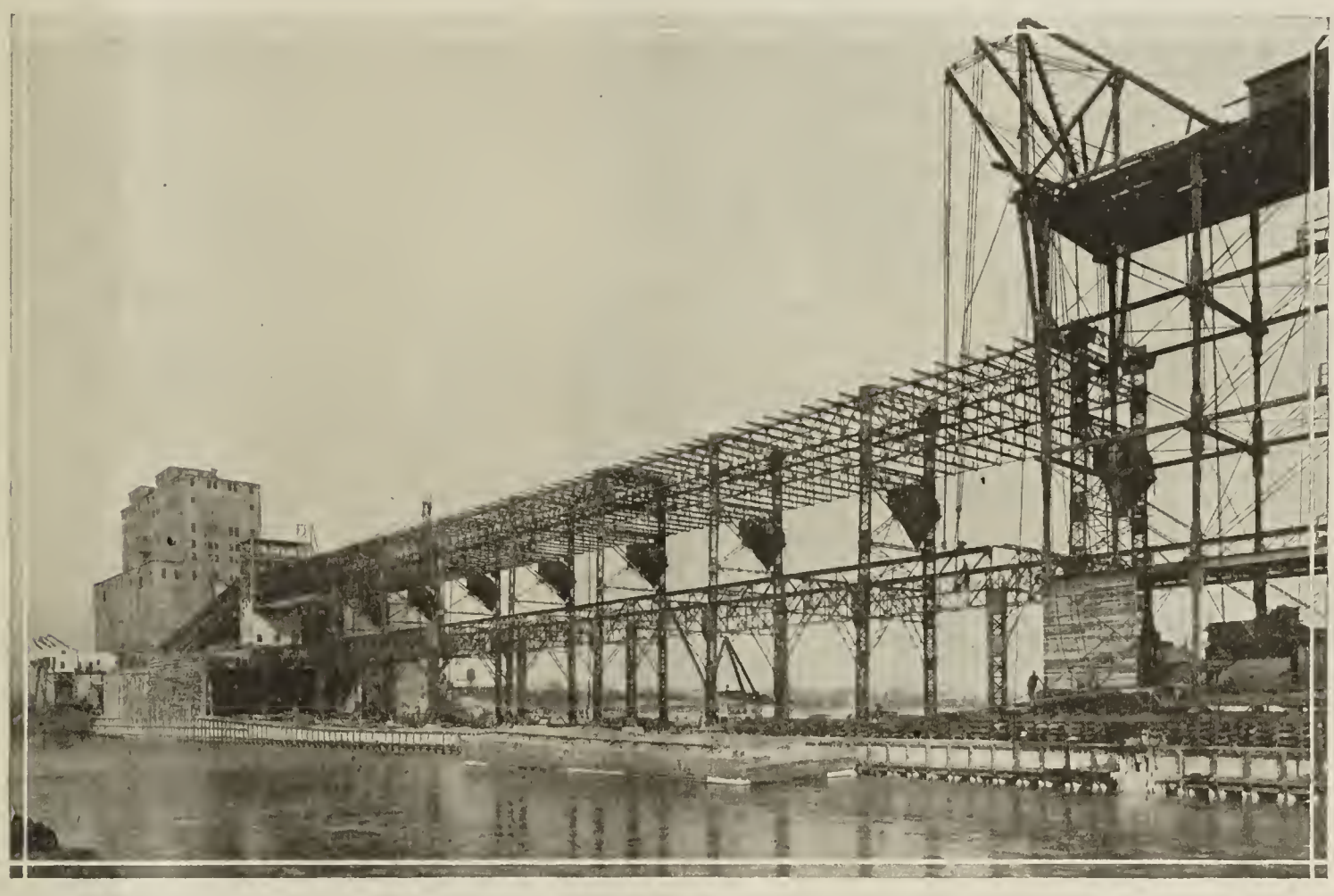
endways in either direction, which permits the entire load to be discharged.

These four unloaders are operated by a total of twelve men, and at normal speed it is easily possible to unload 240 cars in an 8 hour day.

From the hopper into which the grain is dumped by the car unloaders it is caried on belt conveyors to endless elevating bucket belts. There are 19 of these bucket belts, each 220 ft. high, each of which is operated by an individual motor and is equipped with automatic takeups and stops.

These bucket elevators empty the grain into bins that hold the grain from one car, while that from the previous car is being weighed.

The scales, of which there are 23, weigh grain at the rate of 2,000 bushels at a time. From the scales



In the background at the left is the elevator. The steel structure is the shipping pier

the grain can be sent to the storage bins, or directly into a ship, or back to the cars.

When the grain is to be loaded on ships, it is transferred to shipping bins, from which discharge spouts take it to the ships. These spouts are enclosed and hoppers are provided which break the fall of the grain half-way down, thereby reducing the amount of dust.

Another feature is the drying house, which is a separate building. When necessary, grain can be sent to this department, where it can be sifted and treated to hot and cold air.

This structure was designed and built by James Stewart & Company, Inc., of Chicago, under the direction of Mr. W. R. Sinks, manager of the Stewart grain elevator department.

Not only was Leschen Wire Rope used in the building of this elevator, but it is being used to operate many of the modern devices already described.

"$2,000,000,000" Road Show

"The Plus-Two-Billion-Dollar Show" would be an appropriate title for the Chicago Good Roads Show, since more than $2,100,000,000 have been appropriated for highway construction to be expended within the next several years. One-third of this amount is immediately available.

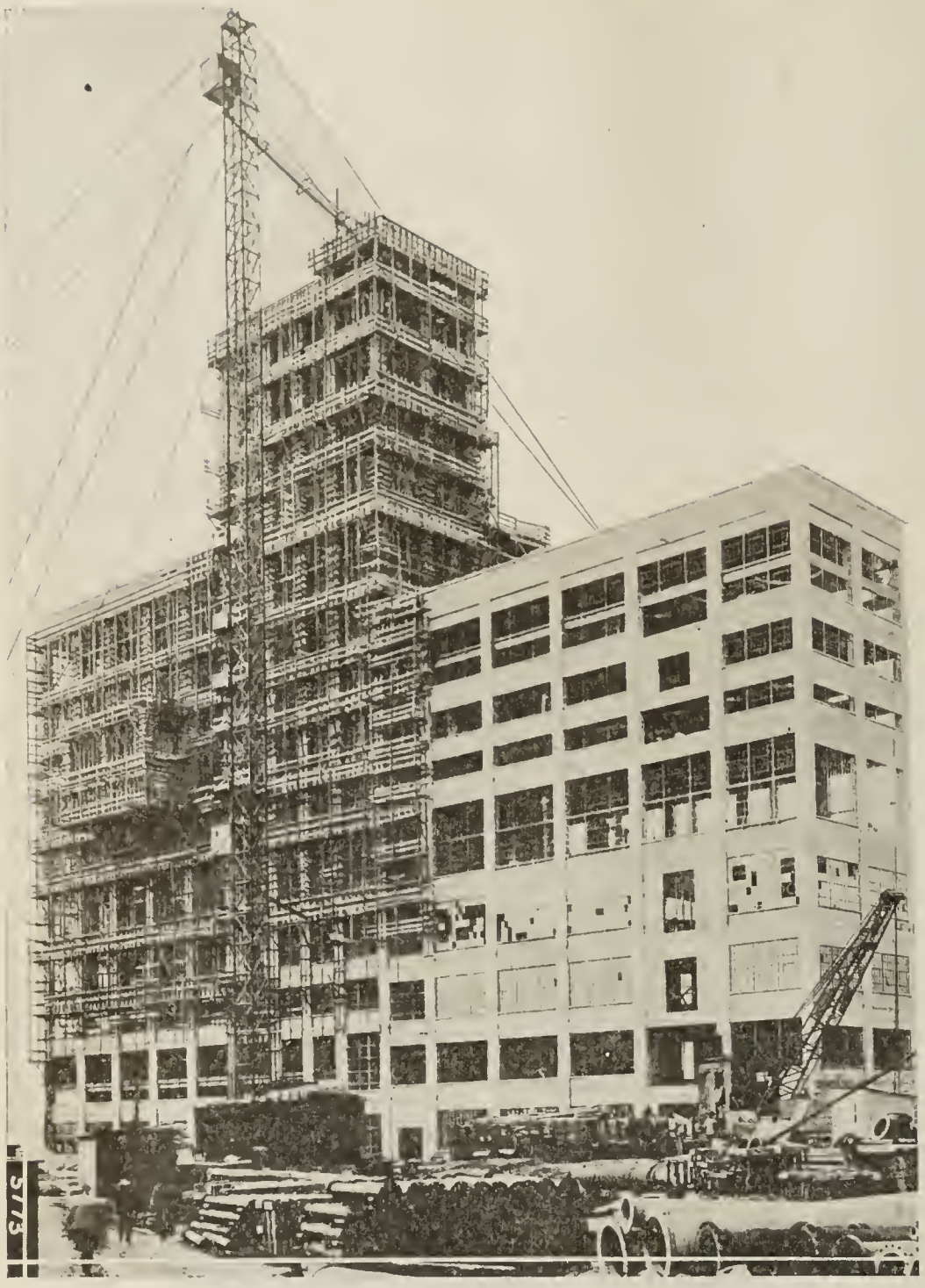
To supply the equipment necessary for translating this huge fund into roads will tax to the utmost the ingenuity of the several road machinery manufacturers.

Anticipating this condition, the Austin Machinery Corporation began, as early as the middle of last year to plan for production on a scale of such magnitude as to make all previous operations fade into insignificance.

Four large plants, with a combined capacity equal to almost any demand, are now running production for early spring delivery of drag lines, paving machines, gasoline locomotives, batch cars, industrial track, wagon loaders, etc. District branches and warehouses at central distributing points, each flanked on all sides by subsidiary offices, compose a chain of service stations capable of rendering competent service whenever and wherever required.

Austin Cube Pavers are rapidly becoming standard equipment in ever increasing territory. Among recent repeating purchasers of Austin paving equipment are Bates and Rogers, eight machines; Wayne County (Detroit) Road Commissioners, two of the largest all-multipedal machines ever made; Pennsylvania, through Chief Engineer Colonel Wm. D. Uhler, three similar machines.

Wayne County roads, because of their well-known quality and durability, are generally recognized to be the pattern roads of the world. Especially significant is the fact that Wayne County (Detroit) made their durability record by using Austin "Cube-mix" concrete which is the required "Dry-mix" now demanded by the best practice.



The bone black filter house

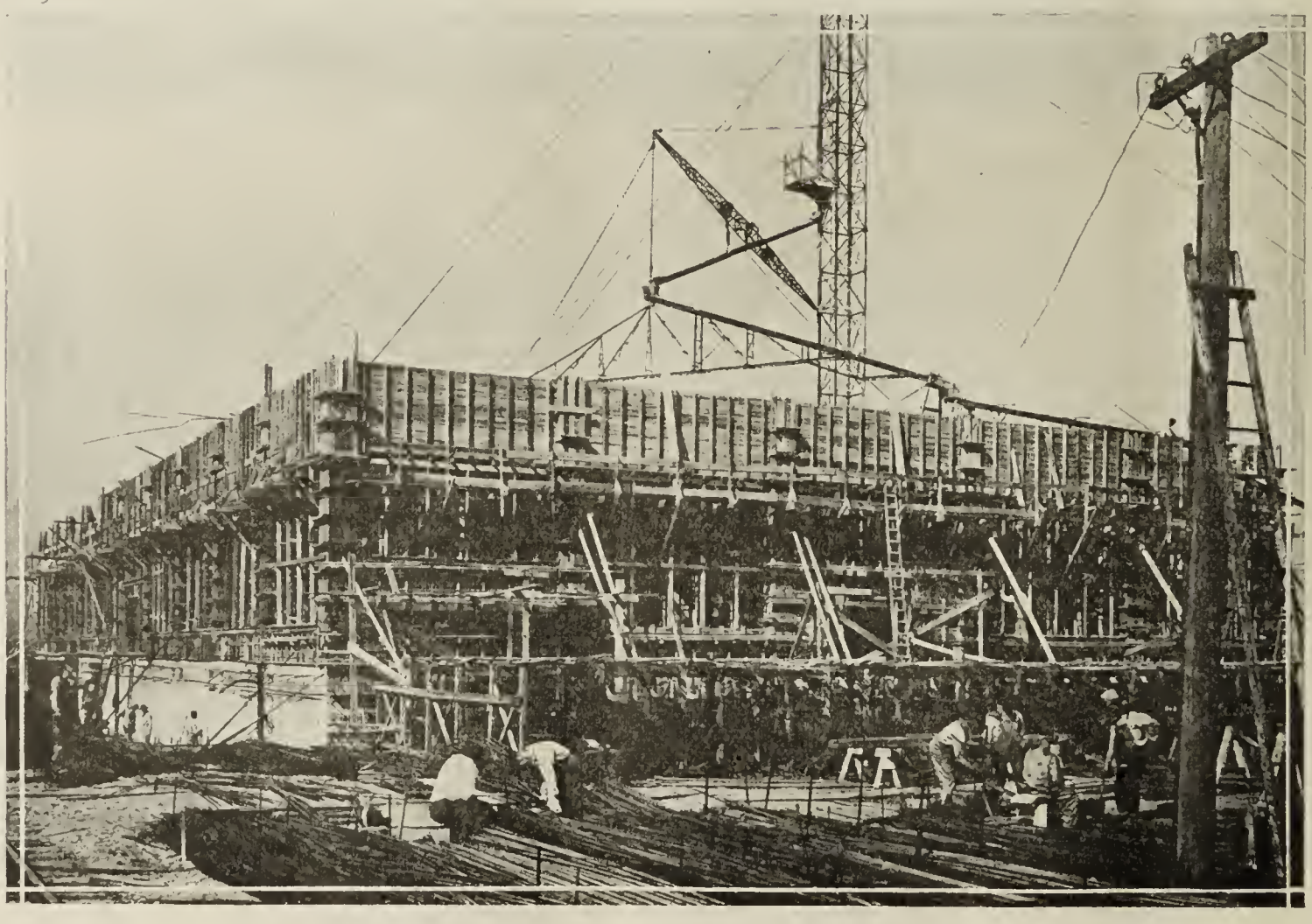
Modern Reinforced Concrete Factory Building

The A. E. Staely Manufacturing Company, of Decatur, Ill., large manufacturers of starch and other corn products started in the early summer of 1919 on a building progarm which had as its object the enlargement of its plant and the preparation for entrance into the production of glucose and syrup, as well as increased output of starch, gluten feed and corn oil.

The object as carried out called for an expenditure of, in round numbers, three million dollars, and in brief includes the following items: pumping station of 13,000 gallons daily capacity, boiler house, starch house, syrup house, feed house, mill house, refinery building, bone black filter house, sewers, water mains, and three miles of railroad track.

Of the entire set of buildings, the refinery and the bone black filter house adjoining are perhaps the most interesting from a construction point of view. The foundation of both refinery and bone black filter house consists of clusters of concrete piles with reinforced concrete caps over each cluster. The piling reached an average penetration of about 15 ft., further driving being prevented by the extremely hard character of the soil underlying the buildings. All foundation piling was driven by the MacArthur Concrete Pile and Foundation Company, of 120 Broadway, New York.

In the refinery building there was placed a total of 2,110 cubic yds. of concrete and 851,760 lbs. of steel. In the bone black filter house 7,200 cu. yds. of concrete and 2,600,000 lbs. of steel were used.



The three-story reinforced concrete syrup house

All floors have been designed to support 200 lbs. live load per sq. ft.

The construction plant for concrete work on the refinery and bone black filter buildings consisted of a No. 12 steam driven mixer, a storage bin for sand and gravel and a 240-ft. steel tower and chutes.

Sand and gravel were placed in storage bin from cars by means of a locomotive crane equipped with clam-shell buckets, and cement was fed to mixer directly from cars on a track adjoining mixing plant and built for that purpose. Sand and gravel were drawn from the bin into a measuring chute containing one batch and from there discharged into mixer.

Concrete work was carried on continuously during cold weather and scarcely a day passed when concrete was not poured 20 hours out of each 24. All aggregates were heated in the storage bin by means of steam coils, and hot water was used for mixing. Concrete in forms was kept at the proper temperature by means of salamanders fired continuously, and as a result there was not the slightest loss due to cold weather.

The first piling was driven on the job about July 1, 1919, and the last concrete was poured May 1, 1920.

All buildings were designed under direction of Mr. G. E. Chamberlain, general superintendent of the Staley Company, and construction was carried on under Mr. J. W. Cook, superintendent of construction. Mr. M. P. O'Brien was in active charge of field engineering. All work was done by the Staley organization with the exception of foundation previously mentioned, and structural steel fabrication and erection.

The construction equipment for this large plant, including Leschen Wire Rope, was furnished by Geo. F. Smith, St. Louis, Mo.

Promises Plenty of Cement for Everyone

For a year or more up to several weeks ago the conduct of business resembled an obstacle race," says the Universal Portland Cement Company, in a circular letter urging that construction work be started now. "Railroad service was demoralized, production was low, labor scarce and inefficient, strikes frequent, materials hard to secure and high in price. It was difficult to get things done—and everybody wanted to do them.

"For the last several weeks business has had a clear way before it. Now railroad service is much improved, production is good, labor plentiful and more efficient, strikes infrequent, materials easy to secure and lower in price. It is easy to get things done—and apparently nobody wants to do them.

"During the war building was held back by war restrictions. The result was a large accumulation of work waiting to be done when the armistice was signed. Yet everybody interested in construction work adopted a waiting attitude until about six months after the armistice. Then everybody who had building work to do tried to do it at once, but there were not enough transportation, labor and materials to go around. Prices soared—and the result was turmoil and disappointment.

"Building conditions now are much the same as when the armistice was signed. Because of the interferences just mentioned there is still a large accumulation of work waiting to be done. Yet everybody interested in contruction work is adopting a waiting attitude. If continued it may result in turmoil similar to that experience through the last half of 1919 and nearly all of 1920.

"Everybody knows that there is a shortage of dwellings throughout the country and that rents are high. Rents will remain high until there are enough houses to supply the demand. But homes are not the only thing needed. Construction work of other kinds must go ahead, notably highways and railroad improvements.

"Some people have feared there will not be enough cement available to supply the needs of a large construction program. This is a mistaken impression based on past difficulties. The trouble in the last year of unusualy heavy demand has been not lack of cement manufacturing capacity but inability on the part of manufacturers to keep their plants operating at capacity. The curtailment of cement production was caused by strikes and scarcity of labor at cement plants, strikes in other lines of industry on which the cement plants are dependent, such as strikes in the gypsum plants, the strike of coal miners, a year ago. the strike in the Illinois-Indiana coal fields in July, the strike of railroad switchmen, which extended through the greater part of this year, and the general lack of transportation facilities, including embargoes on the railroads. The ratio of cement production to manufacturing capacity for the entire year 1919 was only about 54 per cent, and thus far in 1920 about 68 per cent. The capacity of all cement mills in the United States is 125 million barrels or more annually. The most cement ever used in the country in any previous year was about 94 million barrels in 1916. That is to say the country has never used as much as 75 per cent of its productive capacity, conservatively estimated.

"There is now and will be plenty of cement to supply the country's needs as long as transportation and other conditions permit cement mills to operate reasonably near full capacity and to ship the finished product.

"Many people are too complacent about the railroad situation. Undoubtedly railroad service has improved greatly through increased efficiency in operation, but the roads are not now called upon to do what they were called upon to do through the last year. Business in general is slowing down and farmers are holding back their products from the market. Business in general is sure sooner or later to revive, and the farmer to send his stored products to market. When both or either of these things occur the railroads will again have more than they are able to do. If everybody wants cement, the farmer turns loose his grain, and business in general quickens, all at the same time, a lot of people are going to be disappointed by delays in their work."

Jeffrey's New Catalog

The Jeffrey Mfg. Co., 914 N. Fourth street, Columbus, O., has just published the advance edition to its general catalog No. 85. The advance edition is called catalog No. 230. It describes and illustrates Jeffrey elevating, conveying, crushing, pulverizing and portable loading machinery, coal mine and tipple equipment, etc. Nearly every industry is represented in a complete exposition of various methods of increasing production and reducing the cost of handling various classes of materials. An illustrated index and illustrations of installations in the back of the book in particular give a good conception of the possibilities of mechanical handling of various products.

Blast at the Dixie Portland Cement Co. Quarry

The accompanying illustrations and complete blast data of a shot in which 48,200 lbs. of ammunitions was used and in which 236,247 tons of rock were shot down, were submitted to Rock Products by General Superintendent W. H. Klein of the Dixie Portland Cement Co., Richards City, Tenn.

The survey of the quarry, computation of loads and compilation of data and results were made in the engineering department of the cement company. It is an established practice with the company to work up such data after every shot so that comparisons may be made of each shot.

The views show that the quarry is a hillside formation and the face shot down varied from 62 ft. 6 in. at the low end of the hill to 134 ft. 6 in. at the highest point. The holes were drilled by Sanderson Cyclone Big Blast Hole drills and the average depth was 103.97 ft. The frontage or burden of the shot varied from 26 ft. at the point where the face was highest to 46 ft. at the end of the hill where the face was lowest. The average frontage was 35 ft. Forty-one holes in one row were shot at one time. The spacing of the holes varied from 16 to 24 ft.

Each hole is numbered and the accompanying table shows the load of powder used in each hole and the cost of powder per hole. Three kinds of powder was used, 60 per cent gelatine, 60 per cent nitro-glycerine and 50 per cent nitro-glyercine. All holes were loaded with 60 per cent gelatine dynamite in the bottom and 60 and 50 per cent pulp dynamite in the top, where both were used.

POWDER USED

Hole No.	60% Gelatine	60% N.G.Pulp	50% N.G.Pulp	Cost
1	250	600	.....	$ 194.25
2	250	350	.....	136.75
3	250	650	.....	205.75
4	250	650	.....	205.75
5	250	900	.....	263.25
6	200	550	.....	194.00
7	250	850	.....	251.75
8	300	300	.....	136.50
9	250	1,150	.....	320.75
10	350	900	.....	285.75
11	300	750	.....	240.00
12	300	700	.....	228.50
13	300	900	.....	274.50
14	300	1,050	.....	309.00
15	200	1,000	.....	397.50
16	300	800	.....	251.50
17	300	1,000	.....	297.50
18	300	700	250	284.75
19	250	1,050	.....	297.75
20	300	800	.....	251.50
21	300	600	350	284.25
22	300	750	300	307.50
23	250	600	.....	194.25
24	350	750	400	347.25
25	250	600	.....	194.25
26	350	600	50	228.00
27	250	250	450	215.00
28	300	250	500	237.50
29	300	650	200	262.00
30	350	650	50	239.50
31	250	750	50	240.00
32	250	950	.....	274.75
33	250	500	.....	171.25
34	250	500	.....	171.25
35	250	650	.....	206.75
36	250	700	.....	217.25
37	250	400	.....	148.25
38	250	450	.....	150.75
39	250	400	.....	148.25
40	250	350	.....	186.75
41	250	350	.....	136.75
E- 1	200	200	550	214.75
E- 2	250	700	.....	217.25
E- 3	250	300	.....	125.25
E- 4	...	850	.....	195.50
E- 5	...	700	.....	161.00
E- 6	...	500	.....	115.00
E- 7	100	450	.....	126.00
E- 8	200	200	.....	91.00
E- 9	...	500	.....	115.00
E- 10	...	450	.....	103.50
Total	12,400	32,200	3,150	$10,904.75

As is shown in the sketch, ten snake holes were used in front of holes 1, 2, 3 and 4; these were spaced 20 feet center to center, and 450 pounds of 1¼-inch gelatine powder was used in them. The function of these holes was to aid in breaking the shoulder where the shot ended.

The cost of powder for shooting was analyzed as follows:

Total pounds of ammunition	48,200
Total ammunition cost	$11,463.00
Cubic feet of rock shot down	2,881,058
Weight of rock per cubic foot (pounds)	164
Tons of rock shot down	236,247
Cost per ton	$0.048
Tons of rock per pound of powder	4.9

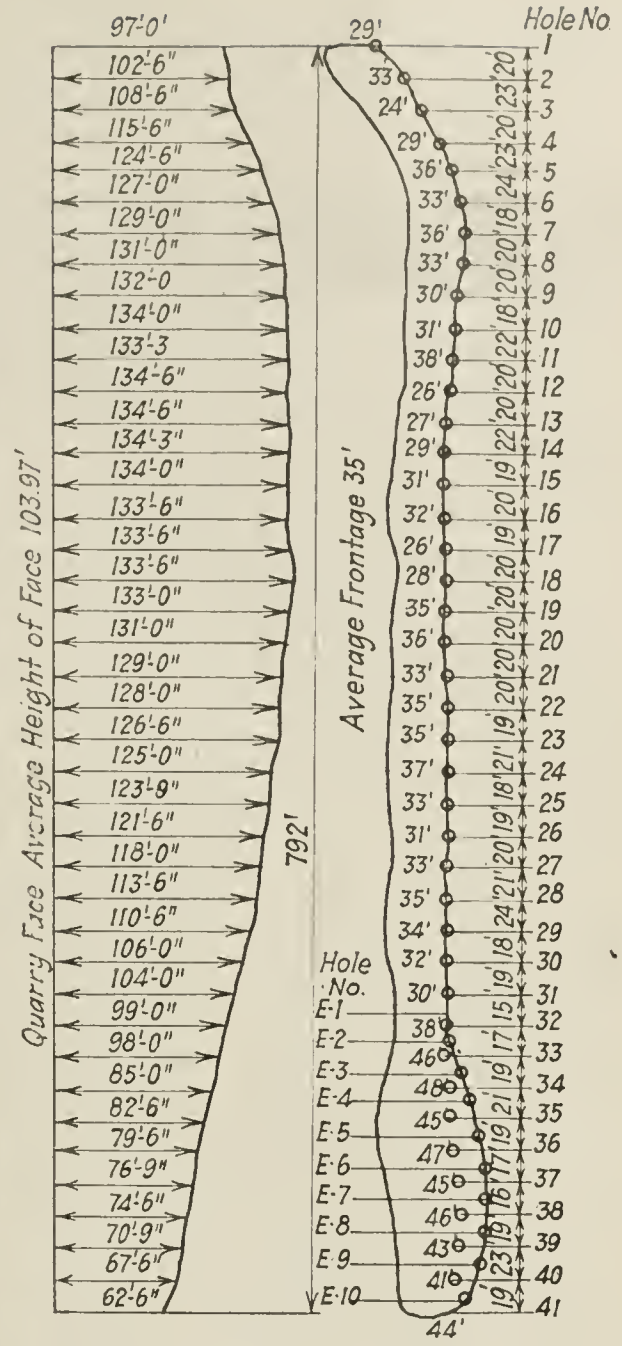
The blast was set off by Cordeau and exploders. Countered Cordeau was used in the holes, because the company has found that where the Cordeau must support its own weight the plain Cordeau is not strong enough. The only difference between plain and countered Cordeau is that the countered has a layer of cotton cord over the lead tube filled with T.N.T. The cotton cord gives additional strength. The Cordeau from each hole was connected o a trunk line of plain Cordeau which ran the entire length of the ledge to be shot.

The connections of these lines were made by splitting the ends of the Cordeau projecting from the holes and then laying the plain trunk line in the crotch thus formed and then wrapping the split ends about the trunk line.

Detonation of the main holes was produced through this trunk line by means of a No. 8 exploder at the end of the trunk line. The snake holes were detonated by exploders which were connected up in multiple with the exploder on the trunk line. These exploders were ignited by means of a blasting machine. A total of 8,179 feet of countered Cordeau at a cost of $408.95 and 1,100 feet of plain Cordeau at a cost of $46.75 was used.

Elevators and Conveyors

The Dodge Sales & Engineering Co., Mishawka, Ind., announces a new catalog on Dodge standardized elevators and conveyors, which is one of the most comprehensive issued covering these subjects, and is really a textbook in its line. Complete tables of data incorporated in the book represent an immense amount of work by the company. An interesting feature is the simple manner in which designs involving gearing are worked out, whereby almost any drive, whether for a conveyor, elevator or other speed reduction, can be picked out of tables; pitches, numbers of teeth and shaft sizes. All problems are thus solved without complicated calculations. The catalog is printed on fine enamel stock paper; has 160 pages and about 150 illustrations. It was prepared under the direction of A. O. Gates, M.E., of the Dodge Sales & Engineering Co., whose design of bucket elevators has resulted in greatly improved elevator practice.



Cut No. 1:

View of the 100-ft, face just before the blast, taken from the end nearest the cement plant, showing the amount of ledge which was blasted and the lay-out of the face. The ledge is well stratified and clear of any seams which would make blasting difficult.

Cut No. 2:

The rock was considerably broken up by blast and leveled to a 40-ft. depth, as shown by this view, which was taken after the blast. Some of the store was thrown out 100 ft, from the face, but no damage was done to trackage and equipment.

Cut No. 3:

The blast from the distance.

"Marque Speciale" Swiss Cement

New Portland Cement with Remarkable Properties for Developing Early Strength. By Capt. Henry Pooley, B.Sc., Assoc., M. Inst. C. E. W. A. Brown & Pooley, Ltd., Consulting Engineers, 61 Chancery Lane, London, W. C., England*

During a Visit to Switzerland in April of this year it was the writer's privilege to visit the Holderbank-Wildegg portland cement factory at Wildegg near Zurich. This factory is of such unique interest both with regard to the automatic nature of the method of production and the extraordinarily good quality of the portland cement produced, that a few words about the factory and the cement itself will no doubt be of interest.

So startling is the quality of this cement that considerable enquiries were made by the writer, and he was given some interesting data, which he had the opportunity of verifying for himself. He availed himself of this opportunity and in consequence is of the opinion that it is difficult to underestimate the effect that the "Marque Speciale" portland cement manufactured at Holderbank will produce upon the portland cement industry of the world, when the full facts are made known by those interested in the factory.

The factory was designed to produce 120,000 metric tons per annum, but in Switzerland there is a board of control which distributes the output proportionately over the various factories and Holderbank's share is only rather more than half this quantity. Thus the factory is working under great economical disadvantages, and the financial success it has achieved is all the more to its credit.

The method of production is worthy of note, but the quality of the finished product is such that it is difficult to state its nature and properties without appearing to exaggerate. In short, such quality has not been placed on the market anywhere else within the writer's knowledge. It will be as well to write a few words about the method of production, although these will necessarily be incomplete as there are certain processes which are the secret of the manufacturers. It must therefore suffice to indicate the general lines of manufacture.

Quarry Operation

The raw material is an argillaceous limestone interstratified with shale. It is excavated from a hill situated about 200 to 300 yards from the works and it varies considerably in composition throughtout the deposit. It was pointed out to the writer that this variation was one of the chief initial difficulties with which the company had to contend at its outset. How well it has been overcome will be realized where it is stated that the daily lime content of the slurry introduced into the kiln has been constant to the second decimal place for the last two years. The writer looked over these records himself and confirmed this fact, but be did not bother to ascertain figures further back than two years.

The company has expended considerable labor upon the quarry and its method of excavation consists in the formation in the hill itself of gigantic and steep cone-shaped craters. The sides of these craters form the face of the quarry, and portions of limestone and shale are blasted out. These portions fall to the apex at the bottom, and by their own weight are forced through an opening into a subterranean tunnel with substantial concrete walls. Here the pieces are shot into trolleys attached to an overhead transporter and are conveyed over the 200 to 300 yards separating the quarry from the factory.

(American quarrymen will at once recognize this process of quarrying as the "glory-hole" method, for a long time so popular in California and the other West Coast states. It has always been considered a peculiarly American institution. This process of quarrying is being largely abandoned now in California and elsewhere, in favor of steam-shovel methods, owing chiefly to the great scarcity of quarry labor.—Editor.)

Crushing and Pulverizing

The cars are tipped onto a grizzly and fed into jaw crushers. From the jaw crushers the material passes through crushing rolls and is then reduced to about walnut size. It is then elevated into a hopper over ball tube mills and is fed into these mills through pan feeds. Water is introduced in the usual way, and the resulting slurry from the ball tube mills is pumped into a series of mixers. These are six in number, each holding roughly 10,000 cubic feet of slurry. These mixers act alternately as correcting tanks and tanks for feeding the kilns.

The slurry is next pumped into a tank situated over the kiln, whose contents are kept at a constant level. The overflow from this tank returns to that particular slurry container which is at the moment feeding the kiln and an agitation due to this circulation results. Compressed air is used for slurry agitation and a perfect mix is obtained.

Kilns and Coolers Combined

There are two rotary kilns and coolers each 216 ft. over all in length and 8 ft. 6 in. in diameter, with enlarged firing zones 10 ft. in diameter. The cooler is attached to the kiln in prolongation and is about 16 ft. long. It might be expected that the clinker retained too much of its heat on leaving. This is not so, as the writer was able to pick up clinker just dropped from the cooler and hold it in his open hand. The proof of the pudding is in the eating and when these manufacturers actually save at least 5 per cent in coal consumption, this method of cooling the clinker must be very efficient.

The cool clinker falls directly onto a Zimmer conveyor, and is then elevated and distributed by another conveyor over a large clinker storage. The quality of the clinker produced is really good and on breaking pieces there was in no case any evidence of free lime. On leaving the clinker storage the required proportion of gypsum is added and the whole is elevated into a hopper over the cement grinding mills, where it is ground to an average of 2.5 per cent on a 180x180 mesh. The cement is then conveyed to a cement store and is ready for use.

The above operations described are on the whole those in general use with the "wet" process of portland cement manufacture, although there are a few outstanding features in the way of machinery, as for example specially designed slurry pumps of cheaper initial cost and running, special air mixing for the slurry, and one or two other machines. But the layout of the factory is so excellent and everything is so carefully arranged with a view to economic production, and there is such minute attention to the detail that cheap manufacture and excellent quality result. In 1919, in spite of the fact that the price of coal was 108 Swiss francs a ton, they sold their cement at about 60 francs a ton. They also succeeded in showing a

*Written for Rock Products.

very substantial profit on the year, which they have done since their initiation in 1913. It is true that their manual labor is fairly cheap and averages throughout the factory about 12 Swiss francs a day.

Cement of Exceptional Quality

The outstanding feature of the factory is the quality of the finished portland cement. The manufacturers have spent years of patient study and research in devising and testing certain methods by which they could increase the growth in strength of the cement, and they have been singularly successful. They have discovered a process, which of course is secret, by which the strength of the cement in the first few days after setting is made to increase with great rapidity, of which property more will be said later. It must be clearly understood that this growth in strength has nothing whatever to do with the setting time, which can be regulated according to specification.

Of such interest to the industry is this portland cement that certain tests were performed for the writer's benefit on samples selected and sent to London. These were analyzed and tested by a well-known and old established firm of London analytical chemists who specialize in cement testing. The truly remarkable results from the haphazard samples are given below in full.

An interesting test was seen by the writer in the laboratory of this factory in Switzerland and samples of the test were brought away by him. These consist of discs made from the "Marque Speciale" portland cement of 14 in. diameter and 5/8-in. thick, set in an ordinary atmosphere without a damp cloth or any other artificial agency, which demonstrate above all other tests the soundness of the cement. The discs show not the slightest sign of cracking or warping or deformation of any description.

Remarkable Early Strength

The remarkable strength both in tension and compression will be noted after three days. The writer drew up some comparative tables for his own satisfaction and plotted the results in the form of a graph. The curve of growth in strength of the "marque speciale" portland cement showed a strength at three days unequalled by other portland cements in most cases at 28 days. Furthermore the "Marque Speciale" cement continues to grow in strength ahead of all other brands of portland cement known to the writer. It will be noticed that the finished cement possesses a fineness of 2.5 per cent on 180x180 mesh sieve. This is a useful property and one which contributes largely to the high sand-carrying capacity referred to later. The soundness test by the Chatelier method should be observed and it is notable that this cement possesses an absolute constancy of volume at all temperatures. The early rapid growth in strength might be in part attributed to a high lime content and the thought occurred to the writer. However, examination of the analysis of the cement given above shows that this is not the case.

It might be assumed that the cost of producing this cement is greater than that of ordinary portland cement. As a matter of fact, the reverse holds good, and the costs are slightly less owing to a low fuel consumption and the employment of fewer men. Roughly 5 per cent less coal is used for burning in the kiln than for the average "wet" process, and throughout the factory there is approximately a total saving of 15 per cent on the cost of production of ordinary portland cement.

Used for Big Gun Mounts During War

It was during the war that the Holderbank factory first introduced its new methods of manufacture, and it was not until 1915 or 1916 that the "Marque Speciale" cement was put on the market. The output was taken by the French Government, which used it amongst other things for making platforms for heavy artillery. The writer saw several testimonials from French military officials which emphasize the value of the cement. One of these is to the effect that heavy guns mounted on platforms made from "Marque Speciale" cement could be fired upon the fourth day after setting, whereas regulations forbade platforms of ordinary platform cement to be used before three weeks.

The advantages of "Marque Speciale" cement to users are obvious to anyone understanding the requirements for constructional purposes. Owing to its very rapid growth in strength, especially in the first three or four days, it must be invaluable for use at low temperatures, for marine work, etc., and where rapid early tensile and compressive strengths are essential. A tremendous saving is evident when shutterings (forms) for ferro-concrete (reinforced concrete) and other construction can be removed at the end of three days, whereas in the case of other cements these would need to remain in place for a very much longer period.

If only ordinary results are desired, and if there is no special reason for using a cement of such high early tensile strength, this cement can still be used with advantage over ordinary portland cement. The writer was able to confirm this statement by viewing English and Continental tests which show the "Marque Speciale" cement to have a high sand-carrying capacity. In short, as much as two or three times the usual proportion of sand can be used, and the same result achieved as with ordinary portland cement and sand.

Not Costly to Install

The writer made some inquiries as to the cost of installation of a plant for the manufacture of "Marque Speciale" portland cement and was surprised to find that the cost of installation does not exceed that of a plant for the same output for the manufacture of ordinary portland cement. The Holderbank factory was completely erected, equipped and commenced on a capital of 3,600,000 francs. The price would be much more today, but this applies to everything else. Before the war a factory for the manufacture of ordinary portland cement would have cost about the same erected in the same place and designed for the same output.

Uniform Quality

Another advantage the manufacturers at Holderbank have been able to show is that their cement has a remarkable invariability of quality. As those connected with the industry well know, it is most difficult to keep the quality of the cement the same at all times and at all periods of the year. This result has been achieved and it seems to make no difference as to when the cement is taken or from what part of the silo it comes, the quality is precisely the same.

There is an old-fashioned school of engineers who state that they would rather see a slow growth in the strength of the cement over a long period rather than one which is prompt. They do not like anything which would tend to accelerate this growth, and they represent that conservative element in industry which always fights against new methods and new productions.

This seems to be a very foolish attitude to assume. For example, when buying a chair, we should experience a shock if told that although a very good chair, special care must be taken of it for the first few days as the material had not yet had time to assume its proper strength. How much better to be able to use

it at once, and to be assured that the cement we buy will gain its strength almost at once.

Of course the setting time can be regulated according to specification to quick, medium or slow, and once again the writer would emphasize the fact that this has nothing whatever to do with the rapid growth of strength. Let there be no confusion on this point, as the cement may be slow setting and yet gain its strength in the first three or four days, as indicated by the tests.

In conclusion, the writer ventures to express the opinion that the methods used in the Holderbank factory and the quality of the product turned out will revolutionize the cement industry when the facts are more widely known. It is not the intention of the manufacturers to hide their light under a bushel, but they wish to profit by their years of research, and to place before others the advantages of their experience, and the writer understands that it will not be long before these new methods are introduced in various parts of the world. It is certain that this will result in great benefit to all portland cement users. They will be able to purchase a cheaper cement of unrivalled quality. In this country (Great Britain) the price of cement is such that engineers will use it only when they are obliged to do so, and fresh impetus will be given to the industry when a cheaper and better cement is launched on the market.

A new era in the portland cement industry has dawned, and a new process for the manufacture has been discovered. It will happen as always happens when something newer and better is evolved, and the old factories in England and elsewhere, unless they introduce the new methods and improved machinery, will now be obliged to shut their doors for good and all and give place to more modern practice.

Result of tests of a sample of cement sent in a hermetically sealed iron drum from Switzerland:

A. CRUSHING STRENGTH PER SQUARE INCH

Cubes of neat cement, and also composed of three parts of standard sand to one of cement by weight, gauged and treated in an exactly similar manner to the briquettes, were tested for crushing strength with the following results:

1. Neat Cement

3 days—lbs./in².	7 days—lbs./in².	28 days—lbs./in².
No. 1 crushed at 5630	No. 7 crushed at 8795	No. 13 crushed at 9324
No. 2 crushed at 6333	No. 8 crushed at 9324	No. 14 crushed at 9500
No. 3 crushed at 7739	No. 9 crushed at 8443	No. 15 crushed at 9676
No. 4 crushed at 7917	No. 10 crushed at 8621	No. 16 crushed at 9412
No. 5 crushed at 7037	No. 11 crushed at 8795	No. 17 crushed at 8796
No. 6 crushed at 7037	No. 12 crushed at 8443	No. 18 crushed at 9850
Mean 6949	Mean 8737	Mean 9426

2. Three Parts Standard Sand, One Part Cement

3 days—lbs./in².	7 days—lbs./in².	28 days—lbs./in².
No. 1 crushed at 2638	No. 7 crushed at 4222	No. 13 crushed at 6861
No. 2 crushed at 3518	No. 8 crushed at 4046	No. 14 crushed at 5803
No. 3 crushed at 2990	No. 9 crushed at 4574	No. 15 crushed at 6333
No. 4 crushed at 3518	No. 10 crushed at 4926	No. 16 crushed at 6333
No. 5 crushed at 2990	No. 11 crushed at 4222	No. 17 crushed at 6333
No. 6 crushed at 3518	No. 12 crushed at 4574	No. 18 crushed at 7739
Mean 3195	Mean 4427	Mean 6507

B. TENSILE STRENGTH PER SQUARE INCH

Water used for gauging 20.14 per cent. Briquettes placed in water 24 hours after gauging. Strain applied at the rate of 100 lbs. in 12 seconds in a Standard Testing Machine.

1. Neat Cement

3 days—lbs./in².	7 days—lbs./in².	28 days—lbs./in².
No. 1 broke at 820	No. 7 broke at 850	No. 13 broke at 875
No. 2 broke at 810	No. 8 broke at 870	No. 14 broke at 860
No. 3 broke at 830	No. 9 broke at 815	No. 15 broke at 870
No. 4 broke at 840	No. 10 broke at 880	No. 16 broke at 880
No. 5 broke at 835	No. 11 broke at 840	No. 17 broke at 890
No. 6 broke at 820	No. 12 broke at 910	No. 18 broke at 910
Mean 826	Mean 860	Mean 880

2. Three Parts Standard Sand, One Part Cement

3 days—lbs./in².	7 days—lbs./in².	28 days—lbs./in².
No. 1 broke at 440	No. 7 broke at 510	No. 13 broke at 540
No. 2 broke at 430	No. 8 broke at 530	No. 14 broke at 540
No. 3 broke at 380	No. 9 broke at 500	No. 15 broke at 550
No. 4 broke at 390	No. 10 broke at 490	No. 16 broke at 510
No. 5 broke at 395	No. 11 broke at 515	No. 17 broke at 570
No. 6 broke at 410	No. 12 broke at 525	No. 18 broke at 550
Mean 407	Mean 512	Mean 543

Fineness—Residue when sifted through a No. 180 x 180 sieve, 2.5 per cent. Residue when sifted through a No. 76 x 76 sieve, nil.

Specific Gravity—3.082.

Setting Properties—Initial, 1¼ hours. Final, 5 hours.

Soundness—By Chatelier method—After 24 hours aeration, 0 millimeter. After 7 days aeration, 0 millimeter.

Hydraulic Modulus—2.75.

Chemical Aanalysis

Water, Carbonic Anhydride	3.30
Insoluble Residue	.79
Silica	19.53
Alumina	7.38
Oxide of Iron	2.20
Lime	61.40
Magnesia	1.95
Sulphuric Anhydride	2.57
Alkalies and loss	.88
	100.00

Big Improvements By Alsen Cement Co.

Revolutionary Changes and New Machinery to Cost Upwards of $500,000

In viewing the vast chasms and yawning tunnels cut into the solid rock over acres of surface at the quarry of the Alsen Cement Company, near Catskill, N. Y., one is impressed not only with the bigness of the operations of this plant in the past but with the vastness of its plans for the future. And, incidentally, the idea occurred that here was the very spot for a movie picture scenario, which would involve any kind of mining adventure—gold, diamonds, copper, iron, or what not—for the surroundings look as if all the gnomes from elfland had been engaged in tearing the rocky ridges to pieces and providing fearsome cliffs and darksome caves for deeds of desperation or heroic adventure. While looking at the vast excavations, the superintendent was asked by the observer if there was danger of the supply of limestone rock being exhausted. "Not in a thousand years," was the reply.

A busy switch engine was dragging trains of small cars in and out of tunnels and yawning fissures, and a steady procession of cable cars was going and coming in the direction of the mill buildings. Tons upon tons of rock were being thus automatically transported as if by unseen forces. It may be remarked, in fact, that practically all the operations of this mill are automatic, with just the proper amount of human oversight.

Portland cement is composed of definite quantities of duly burned limestone and clay, both of which exist in unlimited amounts on the company's property. These materials are ground to an impalpable powder in mills that for noise would outclass an earthquake and the ground product is then subjected to a temperature of 3,000 degrees Fahrenheit in great slowly-turning cylinders, fed with powdered coal by a compressed air blast, when the product becomes clinker. It is then transported by a movable crane to the hot clinker pit, from which it is carried to the seasoning beds, where it is exposed to the open air for a month or more, this treatment having been found to improve the material for cement. Then the "clinker" is ground into cement.. and packed automatically into barrels and

The Alsen Cement Works

bags, by machines which also automatically declare the weight.

In this process of cement-making, the utmost exactness is required as to quantity and quality, and hourly scientific tests are made to insure this painstaking exactness.

New improvements are being made at the Alsen cement plant, costing about $500,000, which include the erection of a sewage disposal plant with modern sanitary laboratories, a new hospital and a new stock building. Part of this work has been completed, the two laboratories and hospital being constructed of reinforced concrete even to the roofs and are entirely fireproof.

Another important improvement is an electric Terry crane, to cost $50,000, the foundation of which 26x27 feet, now being erected. The crane, which will be equipped with a 2½ yd, bucket, will have a boom of 90 feet spread, sufficient to reach every part of the storage yard where "clinker" is to be handled. In constructing the foundation for this crane 250 cubic yards of cement and 12,000 lbs. of reinforcing steel are being used.

The new clinker pit will be very capacious, 20x40 feet and 20 feet high of foundation and surmounted by a steel tank 24 feet in diameter and 30 feet high.

The new stock house will be a large structure, which will replace the present large building. The foundations are now in progress.

A shed is also being erected over the shipping dock, so that cement may be loaded in any kind of weather, and the dock is to be enlarged so that three boats may be loaded at one time. The shipping output will be 4,200 barrels of cement per day. This dock improvement will permit water communication with all points, and largely curtail dependence upon railroad shipping.

These improvements and others will result in great economies, in labor, operation and repairs. As illustrating this fact, at present there are 16 mills engaged in grinding the clinker into cement. These 16 mills will be replaced by three No. 726 Allis-Chalmers Compet Mills, 7 ft. x 26 ft., which will do three times the work. There is also being installed three, 500 H. P. Allis-Chalmers D. C. Motors for grinding clinker. A new 200 foot conveyor will carry the clinker into the mill. A No. 9 superhammer crusher is also being installed.

A revolution of the power machinery is also proposed. At present power is supplied by three steam engines generating 500 H. P. each and one generating 1,500 H. P., but this is insufficient and a contract has been made with the Upper Hudson Electric Corporation to supply 500 Kilowatts of electrical energy, equal to 450 horse power. It is designed to use electric power entirely at an early day.

With the completion of these and other improvements, the Alsen Cement Co.'s plant will be one of the most up-to-date in the country. The original plant was built according to German ideas, but in spite of all that was recently said about German mechanical efficiency, the old methods are found to be crude and antiquated in comparison with modern American methods.

The quarry of the Alsen Cement Works

News of the Cement Mills

The annual meeting of stockholders and election of officers and directors of the Gilmore-Portland Cement corporation, Gilmore City, Ia., was held last week, over 300 stockholders from all parts of the state being present. The annual reports showing a year of prosperity were read and matters of business of the company transacted.

M. J. Nicholson was re-elected president, L. H. Van Alstine of Gilmore City, S. E. Weitzel of Gowrie and A. R. Baxter of Cedar Falls were chosen as vice presidents; H. S. Van Alstine of Gilmore City, secretary-treasurer and H. W. Lamphere of Gilmore City as general manager of the plant were re-elected.

The report of the business for 1920 was a matter of much rejoicing among the stockholders. The operation of the plant for the year resulted in a profit to the company of $113,634.68 which represents a big return upon the investment now in the plant. Nearly $50,000 in new construction was reported.

Following the stockholders meeting the directors held a session at the offices of the company when it was determined to hasten the new construction at the plant as rapidly as possible and to continue the plan of increasing the production of the mills from 6,000 sacks to 16,000 sacks daily. The plant will then be one of the largest in the central west.

The salesmen of the Western States Portland Cement Company, Independence, Kans., are all at the home office in attendance at the annual sales meeting. Sales plans and policies are being discussed and formed for the ensuing year. An interesting program has been prepared. G. E. Pierson, sales manager, will act as toast master.

A. J. Meier & Co., Industrial engineers, Times bldg., St. Louis, Mo., whom are interested in the proposed new cement mill to be built at Chester, Ill., write: "Mr. Gordon Willis, president of the Hunkins-Willis Lime & Cement Company of St. Louis was invited to participate in the organization of the Chester Portland Cement Co., but due to a press of business, and other affiliations, he found it inadvisable to cooperate."

The plant of the Monolith Cement Co., Monolith, Calif., employing more than 100 men will close down temporarily.

The Northwestern Portland Cement Co., Mason City, Ia., have closed down for a few weeks to allow the employes to give the plant the annual overhauling and repairs. At the annual meeting of stockholders, the officers read their report, declared the usual dividend, and the following officers were elected: President, C. H. McNider; vice president, A. F. Frudden, Dubuque, Ia.; secretary, F. G. Ray, Vinton, Ia.; assistant secretary, R. E. Boyle, Mason City.

The Lehigh Portland cement plant, Iola, Kans., shut down indefinitely. Several advance orders have been canceled, and no new orders are coming in. Lack of a continuous market for the product was given as the reason for closing.

The Ash Grove Lime & Cement Co's., plant at Chanute, Kans., shut down for repairs.

The Alpha Portland Cement company has purchased the plants and business of the Burt Portland Cement company at Bellevue, Mich.; the Ironton Portland Cement company at Iornton, O., and the La Salle Cement company at La Salle, Ill. C. A. Irvin, 140 S. Dearborn St., Chicago (president of La Salle Cement Co.) has been elected a vice president, and will have charge of the Alpha interests in the territory formerly served by these companies, with headquarters in Chicago.

A large number of men are at work near Richard City, Tenn., in the quarry of the Dixie Cement Co., drilling into a veritable mountain of rock preparatory to blasting it. The mountain of rock is about 135 feet high, 1,000 feet long and 30 feet wide. The workmen are drilling holes down to near the bottom of the strip of rock, and as soon as all the holes are finished they will be filled with dynamite and fired simultaneously. It is planned to dislodge several hundred thousand tons of rock.

Judgement for $50,000 was entered in favor of Guy Mallon, receiver of the Superior Portland Cement Company, Superior, Ohio, in the suit against Justus Collins, former president of the company, for losses caused by the latter's neglect and mismanagement. The order of the Court is that Mr. Collins must pay the amount within ten days.

Interest and costs also are decreed against Mr. Collins. Mr. Collins is enjoined from bringing any legal proceedings to enforce payment of bonds of the company.

The case is that in which a jury a few weeks ago returned a verdict for $100,000 damages against Mr. Collins. The amount was reduced by Judge Peck of Cincinnati to $50,000.

Within another year Davenport, Ia., will have a new industry, a cement manufacturing plant costing about $1,500,000. The Western State Portland Cement Co., Independence, Kans., has already purchased 450 acres of land six miles above Davenport, as a plant site. Ninety acres of this land lies north of the River road, and was purchased for the shale deposits which were found in the hills. The balance of the tract extends from Nutting station to Iowana station, and from the River road to the Mississippi river. All of this latter portion is underlaid wth a high grade of cement rock, with an average of but six feet of clay and soil overlying the rock. Nearly 400 acres of this land will be available for the purpose of quarrying rock. The rock has been prospected to a depth of 120 feet. Geological records lead to the conclusion that a depth of 400 feet of rock may be expected in this locality.

Much of the work of a disagreeable nature that was formerly performed by laborers will be carried on by machinery and this equipment makes a heavy outlay of money necessary.

The mill building proper will occupy ground about 200 feet wide by 500 feet long and will be equipped with four kilns each 220 feet long. The machine shop and store room are now being erected which will provide for the maintenance of all plant equipment at all times. Machinery and equipment is being received and installed as fast as possible. A temporary crusher

plant to manufacture stone for use in construction is being built. Railroad connections with the C. D. & M. railway have been made and operated since Oct 1.

Connections with the D. R. I. & N. W. railway will be made within the near future. Electric power for construction purposes is being secured from the United Light & Railway company. A temporary water supply system has been installed with a pumping plant on Duck Creek. The permanent water supply will be provided by a pumping plant on the Mississippi river. A complete water main system with a steel tank on a tower 135 feet high will be built early next season. A power plant consisting of three 1,000 horse power Diesel engines is under construction.

Payment was made by the Southwestern Portland Cement company of its regular two per cent quarterly dividend on preferred stock January 1, 1921. Checks were signed by C. Leonardt, president of the company.

The capacity of the plant was more than doubled last year by improvements made at the Victorville, Calif. factory.

Waste heat boilers with necessary buildings installed in the El Paso, Texas factory last year, enables the company to manufacture sufficient power to operate the entire factory from the heat escaping from the kilns and to save all fuel consumed in the power plant.

Other installations are those of a large crusher and crusher house, with additional shovel and rock cars and a new stone dryer and dryer house.

The capacity of the plant has been increased 500 barrels a day, giving it a combined capacity of at least 5,000 barrels daily for its two factories.

Net earnings for the year have been considerably more than enough to pay a substantial dividend on the common stock, but on account of the improvements made at an approximate cost of $800,000, the company decided to pass the one-half per cent dividend on the common stock at this time, feeling that it would be able to pay it before the end of the year.

The financial plans of the American Portland Cement Co., W. H. Darrat, president, G. C. Allen, secretary-treasurer, Little Rock, Ark., are about completed and it is expected construction work will start very soon. They have purchased 80 acres in Little River County, on which there is located a most selected deposit of Limestone (white chalk) and clay especially adapted for the manufacture of a high grade portland cement. The second and third kilns to be installed will be 10x175 feet and installed in connection with waste heat boilers.

Coal at the plant of the Wolverine Portland Cement Co., Coldwater, Mich., is received in cars which may be unloaded so that the coal falls onto a receiving hopper where it is directed to Williams hammer mills, from which mills it is carried into storage and to the coal dryer. From the storage bin it is delivered to four 30-in. Griffin mills, used as preliminary machines, and then to a No. 16 F. L. Smidth mill, where the final grinding is done.

The coal, in powdered form, is then conveyed by elevator and screw conveyor, to the 100-ton storage bin and three kiln feed bins at the head of the kilns, where air pressure levies tribute on the coal and feeds it to the kilns. The air is preheated to a temperature of approximately 500 degrees.

By this arrangement the supply of powdered coal is always 100 tons in excess of the quantity at the kiln bins, and being continuously drawn from the bottom of the 100-ton hopper all danger of spontaneous combustion is eliminated. This insures a supply of fuel for the kilns, regardless of what may happen, and avoids the inconvenience of temporary break-down on any part of the coal preparation apparatus.

An explosion of coal dust in the coal room of the Wabash Portland Cement plant at Stroh, Ind., blew all the windows out of the building and did considerable damage to the building. The explosion was caused when the chief electrician and his assistant entered the coal room to make repairs on an electric starter. A short circuit caused a flash that exploded the coal dust. The assistant was almost instantly killed and the chief electrician is not expected to live. Four other men were seriously burned.

Phoenix Portland Cement Co., Nazareth Pa., is constructing a large transformer house to take care of additional power, which will be required to operate the large compartment type mills, which will be installed in the cement grinding department. Last year this company redesigned and reconstructed the entire raw grinding department which has proved very efficient in every respect, as it decreased the amount of labor necessary to operate the plant. Last January a locomotive crane was installed to unload and handle the coal to the mill. Another locomotive crane, electrically operated, has recently been placed in service. It is one of the largest cranes in use at any plant in the Lehigh Valley, being operated on a 16-ft. gage track, and having a boom of 85-ft. swing, with 3-yd. clamshell bucket, which will be used in handling and for storage of crushed cement rock. All improvements at the plant were designed and erected under the personal direction of Howard H. Leh, the company's general superintendent.

Cowell Portland Cement Co., Cowell, Cal., started two kilns with Sil-O-Cel insulation under the lining in the upper end, with a resulting drop in external temperature of 175 to 200 deg. F., as compared with the kilns operating without Sil-O-Cel insulation.

Lehigh Portland Cement Co., Mitchell, Ind., one of the big belts, 6 ft., wide by 120 ft. long, broke while in use. Such an accident never before happened in this mill. The belt has been running about 18 years. There never had been a time when the company was not ready for just such an accident, although it was not expected. Action of the safety guards and the fact that the governors on the engine whose power was transmitted through the belt were kept in proper working order through constant inspection and watching, prevented great damage. It is due to the caution and good sense of the men in charge that more of the unexpected does not happen and that when it does happen the emerency has been anticipated as much as can by Safety First precautions.

In connection with the installation of the new Allis-Chalmers compeb mill in the finish department of the plant of the Nebraska Cement Co., at Superior, Neb., a large electric motor is to be installed. The new motor, which is 500 h. p., has been switched to the plant yards and unloaded. The compeb mill which it is to run is taking the place of a portion of the old equipment. The installation of this new mill and large motor will greatly enhance the efficiency of the plant, and allow the finish end in a measure to keep up with the other departments, which are to be augmented soon when the third kiln is started. This kiln is in the kiln room and being set and made ready as rapidly as possible. In addition to this 500 h. p. motor, about 100 other motors are in operation.

News of the Gravel and Crushed Stone Plants

A Bucyrus steam shovel, type 45-C, with 1¾-yard dipper has recently been installed in the quarry of the Wisconsin Granite Co., Sioux Falls, S. D.

The Fountain Sand & Gravel Co., Pueblo, Colo., reports splendid business and bright prospects. They have a daily capacity of 250 yards and excavate and load their material with a Sauerman dragline cableway excavator.

The newly organized Geneva Stone Corporation has resumed operations at its plant at Oaks Corners, Ontario County, N. Y., and is now turning out 400 tons of broken stone daily. This, it is said, is far from the ultimate output of the plant, as the new giant crusher has a capacity of 1,000 tons in ten hours. In the rebuilding of the plant the latest equipment has been installed and all hand labor has been eliminated. Mechanical facilities are used to handle the stone from the time it leaves the quarry until the broken stone, properly graded, is dumped into cars or trucks for delivery.

The central feature of the new plant is the mighty gyratory crusher into which a carload of rock is dumped and in a moment or two is reduced to crushed stone. The crusher weighs 100 tons, is ninety inches in diameter and crushes rock up to thirty inches in size. A 150-horsepower motor provides the power for the operation.

In getting the rock to the crusher a series of mechanical operations is employed. The virgin rock is shattered by dynamite, and a steam shovel is then employed to pick up the rock and load it in quarry cars. These cars are moved about on a narrow gauge track and are hauled up the incline to the crusher by a cable and an electrically-driven winch. Several motors are employed to operate the various parts of the plant, making a total of 350-horsepower. Another interesting feature of the plant is an electrically-driven well driller. This machine drills the holes for the heavy charges of dynamite that are used in breaking down the rock.

The Wahpeton Gravel & Sand Co., Wahpeton, N. D., have pits at Hereford and Thorosburg, Minn., daily capacity 350 yards. They expect to install a screening and washing plant. They operate a Sauerman dragline cableway excavator.

F. R. Schoen gives the following account of the Pacific Derrick and Hoist Company's system in use in numerous sand and gravel pits.

"There are many sand and gravel operators throughout the western states who have not considered the savings in cost of obtaining the aggregates of sand and gravel, and there have only been a few who have come to a final decision of installing a type of machine which will dig, elevate and convey the material, placing same in hoppers. In most plants of the western states there is used a scraper type, which requires both a pulling aparatus for the digging of the bucket and its return.

"By the use of the slack-line excavator, the bucket is handled from a high-linepull, the digging being done by the pulling line and this same digging line being used for conveying the bucket on the evelating track. The power required for digging is only for a period of time, when the bucket is actually working, after which operation the track line is elevated, lifting the bucket out of the pit and conveying same to the point of dump, which is the highest point of operation on the bunkers.

"With this layout, an ordinary ¾-yard bucket operating in a pit with a length of travel up to 500 feet can produce up to 200 yards of finished product. This actual production can be increased by the types of machines. For the Union County, Oregon, road supervisors we are designing a special 2-drum electric hoist, the rear drum having a speed of approximately 150 feet per minute, the front drum being operated by a high and low gear system, giving a speed of 150 feet on low gear and 450 feet on high gear. With this machine in operation aganist the ¾-yard bucket, the output of the plant should be increased not less than 25 per cent. The hoisting apparatus which we are building is an entirely new design, and while the principles of application have been thoroughly tried out, the two-speed system along the lines which we are building has never before been manufactured. We are going to install four of these machines in Union County, all of which will be equipped with two-speed electric hoists, and we think will be the most complete sand and gravel bunkers installed in the states of Oregon and Washington.

"There are a number of plants throughout the country which are equipped for large production, but they are merely installed for the building of roads and the amount of material required to be produced by these bunkers does not exceed 250 yards per day. This is as much material as can ordinarily be used by the roads."

The new plant of the Texas Portland Cement Co., placed in operation during this summer, is now producing about 2,000 barrels of this material daily. The original plant was designed for a two-unit operation, but only one was installed. In the fall of 1919 construction work began on the second unit, and this was completed during the latter part of July.

Oyster shells are used as the raw material at this plant, being dredged chiefly at Red Fish Reef, in Galveston Bay.

Shortage of coal in the Frederick, Md., district is the main reason for the projection of other power. William J. Grove, head of the M. J. Grove Lime Co., expects to establish a hydro-electric power plant in the vicinity for county service. It is proposed to interest the local Farmers' Association in the enterprise, locating the plant to utilize the water power of the Potomac and Monacacy rivers.

News of the Concrete Products Factories

Concrete marble and granite finish artificial stone, concrete garden furniture in great variety, and specialties in high-grade ornamental building work, including pergola and benches are manufactured by the Ruoff Construction Company, Philadelphia. Their products are a source of pride of the cement industry and an attestation of the beauty of white cement.

The color veins in the artifical marble run through the entire mix, resembling natural marble. The mixture for marble and granite finish consists of sharp crushed marble or white stone, sand and white cement, with coloring added if a colored finish is desired. The product is ground down, and polished the same as natural marble, but for the final finish a special polishing stone and hardening process is used.

Equally interesting are the reinforced concrete, self-supporting, inter-locking, steps for fireproof buildings, with polished face and balance ground and tool dressed. The cost of steps, columns and mould work is much cheaper than natural stone, and if reinforced has greater strength than natural stone in long sections.

The Ruoff Construction Company take contracts for tool dressed or polished cement work of most any stone finish and color, and guarantee it to be weather- and frost-proof.

F. E. Muzzall & Sons,, Crown Point, Ind., are busy manufacturing concrete blocks, vases and flower boxes and erecting Monolithic Concrete Silos using Conklin-forms and MacArthur block molds. They have two Waterlor mixers.

The Cedar Grove Concrete Products Co., Hy Grotenhuis, Mgr., Cedar Grove, Wis., recently organized, is erecting a new factory with steam curing rooms, transfer cars and Dunn block, drain tile, silo molds and Dunn mixer. Will add molds for making other concrete products later on.

The American Concrete Products Co., 1245 Circle Ave., Forest Park, Ill., began business last year, and it is meeting with excellent success. They manufacture a patented concrete post for street lighting.

Modern street illumination demands a system which will afford attractive, efficient service. The lighting standard of today must meet the same modernized requirements of the lighting system.

The American Concrete Products' reinforced concrete posts fulfil all requirements for strength, attractiveness and durability. These posts are manufactured by skilled artisans, according to the best practices in ornamental concrete work, and are well reinforced with square twisted bars.

The materials are carefully graded and properly proportioned. The posts are thoroughly cured and hardened before leaving the plant. Materials and workmanship are guaranteed to conform with the best specifications. All posts are equipped with a conduit for wiring and are adaptable to any make or design of ornamental lamp.

The posts are not affected by the elements or climatic conditions. They are self-cleaning and the surface cannot retain dust or dirt. Concrete posts require no paint or other preservatives. Time only serves to increase their strength.

The post can be had in either round or octagonal design. Either design provides a slender, graceful unit. The finish of crushed granite or limestone and white or gray Portland cement is very attractive. The gray particles glisten and sparkle in the sunlight, which pleasingly accentuate their beauty.

Generally the design and height of posts are governed by surroundings. Trees, width of roadway and class of buildings should receive consideration.

Primarily lighting posts are intended for street illumination purposes. The pleasing contour and surface of the posts produce a wonderful effect on the appearance of the street by day, thereby serving a double purpose.

The standard building block automatic power machines sold by the Besser Sales Co., 1311 20th St., Alpena, Mich., are made in two sizes. The single automatic machine makes one block at a time and runs at the rate of three blocks per minute. Its capacity is 1800 blocks per ten hour day. The double automatic machine makes two blocks at a time and will turn out 3300 blocks per day. These machines are the most powerful tamping equipment on the market. The tampers weigh 96 pounds each and drop ten times a distance of 14 inches each drop in the formation of each unit. The product is as dense, hard and as nearly waterproof as product can be made on any machine. The machines are adapted for the use of a wet mix which combined with the powerful tamping gives the highest possible yield of product per sack of cement and at the same time turns out a quality of product which will meet every building code requirement and satisfy every architectural and contracting demand.

"The world belongs to the energetic."

J. Maloney, engineer and contractor, 6 Church St., Bangalore, India, is in the market for concrete machinery; also machinery for manufacturing cement tiles, including presses, stencils, pallets, mixers, etc., Desires to be put in touch with American manufacturers of this class of equipment.

The Richmond Cement Products & Machinery Co., Richmond, Va., has been incorporated for $100,000. Joseph Vogt, Pres., Wm. Moening, Secy-Treas.

R. Waldie, contractor, 1911 Cedar St., Berkeley, Calif., wants information and prices on machines for making blocks, brick (power and hand) also waterproofing compound and facing materials.

The Elk River Concrete Products Co., Elk River, Minn., operate a Pioneer drain tile machine, Dunn sewer pipe molds, Little Wonder mixer and Caldwell silo molds. Want catalogs and prices on molds for making roofing tile, building blocks, burial vault, culverts and sewer pipe.

Paul Gruenwald, Thiensville, Wis., operates a Schwab block, his own make burial vault molds and a continuous mixer. Wants catalogs and prices on building block, chimney blocks, vases, burial vaults, sewer pipe, porches, septic tanks, fence posts and flower box molds.

The National Concrete Materials Co., Luverne, Minn., has been awarded the contract for $147,000 for putting in 100 miles of drainage tile in Nobles County.

Allie Payne, Orange, Texas, has perfected and manufactured a sectional concrete culvert which will be used by Orange County. The section of concrete at thirty inches forms an arch, the concrete is poured to a thickness of three inches and reinforced with steel strips, making it absolutely permanent. The difference in the cost of 18-inch tiling and this product is $1.34 per lineal foot. Another economical feature of this culvert is that the cost of transportation over bad roads, as this can be hauled out in sections.

The Granette Products Co., 7th and Murphy Sts., Des Moines, Ia., manufacture concrete building trim, tombstones, ets., that closely resemble granite. Designs for the product are made in the plant's pattern drafting department, wood molds are then made and the cement poured in. After the cement has dried the product is taken into a steaming room, where it is steamed for from twelve to sixty hours, depending on temperature and climatic conditions, to accelerate the hardening process.

The plant is equipped with overhead tracks and other labor saving devices, and turns out fountains, burial vaults, road direction signs, and biulding blocks, in addition to the products mentioned above. Officials say that it is the only "manufactured stone" plant of the kind in the middle west.

W. F. Schwieterman, Osgood, Ohio, reports splendid business and bright prospects. He writes that he could sell drain tile and blocks faster than he can make them. Has no troubles. He makes the best and finest looking drain tile, and they sell themselves at sight. Has a truck to deliver them 10 to 15 miles away. Operates a Schenk tile machine, Blystone mixer and Ideal block power machine. He uses the cleanest sand he can get and plenty of cement which spells success.

The Kent Continuous Concrete Mixer manufactured by the Kent Machine Co., Kent, Ohio, is the product of an organization skilled through over 15 years of experience in the designing and construction of machinery., tools and labor saving appliances.

Their own foundry, where the castings for all Kent Mixers are made, their own special machines and mechanics expert at finishing and assembling and their own engineering department with skilled draftsmen, are at your service for the handling of manufacturing and general machinery building problems.

This capable organization, coupled with a thoroughly modern, efficient plant, has made possible their unmatchable record of never having shipped out a Kent Mixer that has failed. The very first Kent Mixer made and delivered 15 years ago is still working daily and only two wearing parts have been resupplied.

The Polk-Genung-Polk Co., 521 Occidental Bldg., Construction is the firm foundation on which many a contractor's business rests. It is especially adapted to silo construction, the surest business for these times. Through the inclusion of a single principle—that of center mast support—the Polk System has elimated all bothers of Circular Concrete Construction. The Polk—Genung—Polk Co., 521 Occidental Bldg., Indianapolis, Ind., will gladly send you their new catalog.

The Nustone Products Corp., 405 Lexington Ave., New York, N. Y., manufacture concrete laundry tubs which are more enduring than throse of soapstone or slate. They are the most economic and lowest cost tubs made. The company is a consolidation of the following well-known manufacturers of laundry tubs: Robinson Peerless Granite Tub Co., Houschold Granite Tub Co., Economy Concrete Co., Fellows & Co., Atlas Wash Tray Co., E. G. Adams and New Haven Granite Works. Their factories are located at New York, Boston, Philadelphia, Baltimore, Weehawken, N. J., Buffalo, New Haven and Kingston. Their field of operation is in New England, New York state, Pennsylvania and the Atlantic coast states. They do not attempt the middle west, although sometimes they ship to Cincinnati and Detroit from their Buffalo works.

American Cement Tile Co., L. W. Barner Mgr., 27 Ave., and N. 23rd St., Birmingham, Ala., are building a new plant with a capacity of 1,000,000 square feet per annum of concrete roofing tile which is exclusively used on factory buildings. Their tile are as large as 26x52 inches, reinforced with steel. C. J. Gapen is manager of the plant. The parent concern is located at Pittsburg, Pa., and has factories there and in New York.

The Eau Claire Sand & Gravel Co., Eau Claire, Wis., manufacture concrete brick as a by-product. The bricks are taken from the press and placed on flat cars and trucked away to steam chambers for curing. There are four kilns and three cars of brick can be put in each one. Steam, under a pressure of 90 pounds is forced into the chambers, where the brick remains twelve hours. The steam is then blown off, returned to the tank condenser, and the brick are taken into the air, for further curing, usually for a period of from two to three weeks.

The Minnesota Pipe & Tile Co., Mankato, Minn., are producers of washed and screened sand and gravel and cement drain tile. Their plants are located at Appleton, Mankato and Olivio.

The Cement-Gun Construction Co., Chicago, Ill., facing inaction during the winter and unwilling to see its regular employees go jobless, has devised a plan which recently propounded to its regular employees. The company is equipped to make concrete septic tanks during warm weather but not during winter. The plan involves fitting up the tank plant with heating apparatus for winter work, allowing regular employees to be given the chance to work at a reasonable wage, and to share in the profits resulting from the sale of the tanks if a market for those manufactured during the winter is found in the spring and summer. Acceptance of the proposition is entirely optional with the employee, and his non-acceptance does not injure his status with the construction company.

The Cementile Products Corporation, M. M. Caldwell president, Geo. W. Chaney, secretary, Roanoke, Va., has incorporated, capital $50,000.

D. N. Thomas, Corning, Ark., operates a Pettyjohn block machine and a drain tile machine. Interested in molds for making culverts, vases, septic tanks and flower boxes.

Ideal Concrete Machinery Co., 1318 Monmouth St., Cincinnati, O., manufactures molds for making con-

crete fence posts. Concrete is poured into the molds and spaded so as to exclude the air. The mold is then left for the concrete to set until posts can be removed and further cured. Forms are usually sold in a battery or set of six. With the forms are included stands and staple benders. Staples are imbedded in the posts when the posts are poured. Forms are furnished in either 7 or 7½ ft. lengths. Posts are triangular in cross section and are larger at the bottom than at the top. Further details may be obtained by writing to the maufacturer.

Recognizing the increasing demand for concrete roofing tile, the stockholders of the Indiana Concretile Company have completed a new plant at 52nd Street and the Monon Railway, Indianapolis, which gives increased facilities for production taxed to capacity by large orders on hand. Among these orders is one from the Lafayette Motors Company for making Concretile roofing for 150 houses.

A large profit can be made from a plant making concrete roofing tile, and success is assured to any company starting in the business, if enough capital is put in to equip a plant with the necessary machinery, to place it in operation, on a production basis sufficient to meet the demand.

Cemcntile Roofing Corporation, A. L. B. Ribble, Mgr., F. B. Griffin, Secy., 19th and Monticello Ave., Norfolk, Va., have recently organized and are erecting a new factory building. Operate F. W. Melde roofing tilc machine. Are interested in building tile machine and molds for making fence posts, vases and flower boxes.

To mect the increasing demand imposed by a rapidly growing business, the new plant of the Cast Stone Co., 17th avenue, H. G. Price, president and manager. Columbus, O., is being rapidly pushed to completion. The new plant, in addition to being thoroughly modern in every respect, offers every facility for the expansion of the business. Located alongside the tracks of the Big Four Railroad, facilities are offered for the convenient transferring of incoming or out going shipments of materials and finished product. For the production of the Cast Stone concrete block the Zaeglemeyer system has been installed. The plant will turnout 600 blocks per day, and arrangements are already being made to install additional equipment during the next year which will double the capacity of the plant.

The Dakota Concrete Stone Co., Sioux Falls, S. D., which is now five months behind in filling its orders, plans the manufacture, on a big scale, of concrete building block, drain tile and culvert pipe.

Although only 2 years old, the company has had a remarkable success. Orders for its concrete culverts and drain tile have fairly swamped the young men who are in control of the company, Stanley H. Edmunds and John B. Wildberger.

State Highway Commissioners, Pierre, S. Dak., have awarded contracts to following for concrete culverts: Dakota Concrete Stone Co., 918 N. Weber ave., Sioux Falls, 25,200 ft. of 15 to 30-in.; Concrete Engrg. Co., Rapid City, 14,350 ft. of 15 to 30-in. Elk River Cement Products Co., Elk River, Minn., 17,200 ft. of 15 to 30-in.

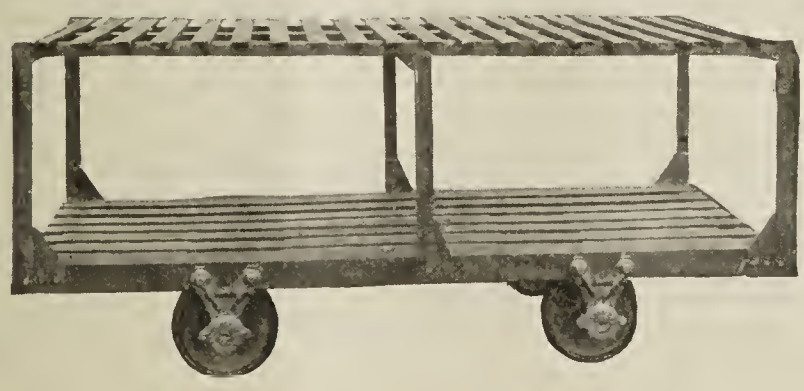
The Automatic Sealing Vault Co., 216 E. River St., Peru, Ind., have a proposition to unfold to responsible concerns which offers unparalleled opportunities in field of business and margin of profit. If you are interested in starting a side line that will some day prove more profitable than your entire present business write them regarding their 1921 concrete burial vault proposition.

Cars for Block and Tile Plants

H. D. Conkey & Co., Mendota, Ill., are manufacturing very efficient cement tile and block cars in single, double and triple deck types, with rigid or folding decks.

The construction of their triple deck car mcets a long felt want among tile, pipe and block men for a car at once strong, easy running, easy to load, and durable. The Conco car is all of these, and yet moderate in price.

These cars are standard 24-inch track gauge. Among their many features of advantage the construction of the decks is probably the greatest improvement. The second and third decks can be raised from either side, and hooked up, while the lower ones are being loaded. This greatly facilitates loading, and as the decks are movable, the upper one can be taken off and the second one raised to a suitable height to permit the loading of extra length tile conveniently.



Conco cement tile and block car bodies, deck frames, and uprights are of angle iron, rigidly braced. These cars will carry their full capacity on all three decks and still move easily, because of the oil-tight roller bearings, and are thus freed from the usual jarring and bumping of a hard running car.

This car is fast becoming the popular car among tile and block makers because of its durability, convenience in loading, light weight, and moderate price. No trouble has yet been experienced in making deliveries.

German Reinforced-Concrete Water Tank

Elevated water tanks of reinforced-concrete have been built recently in Germany. As described in a German paper, the largest of these has a total height of 200 ft., made up of a 164-ft. tower and top tank 36-ft. high. In addition to the upper tank there is a tank at the ground, the bottom of which forms the footing base for the tower. There are also intermediate tanks. The bottom tank has a capacity of 132,000 and the next succeeding tanks have capacities of 17,000, 53,000, 132,000 and 262,000 gal. respectively.

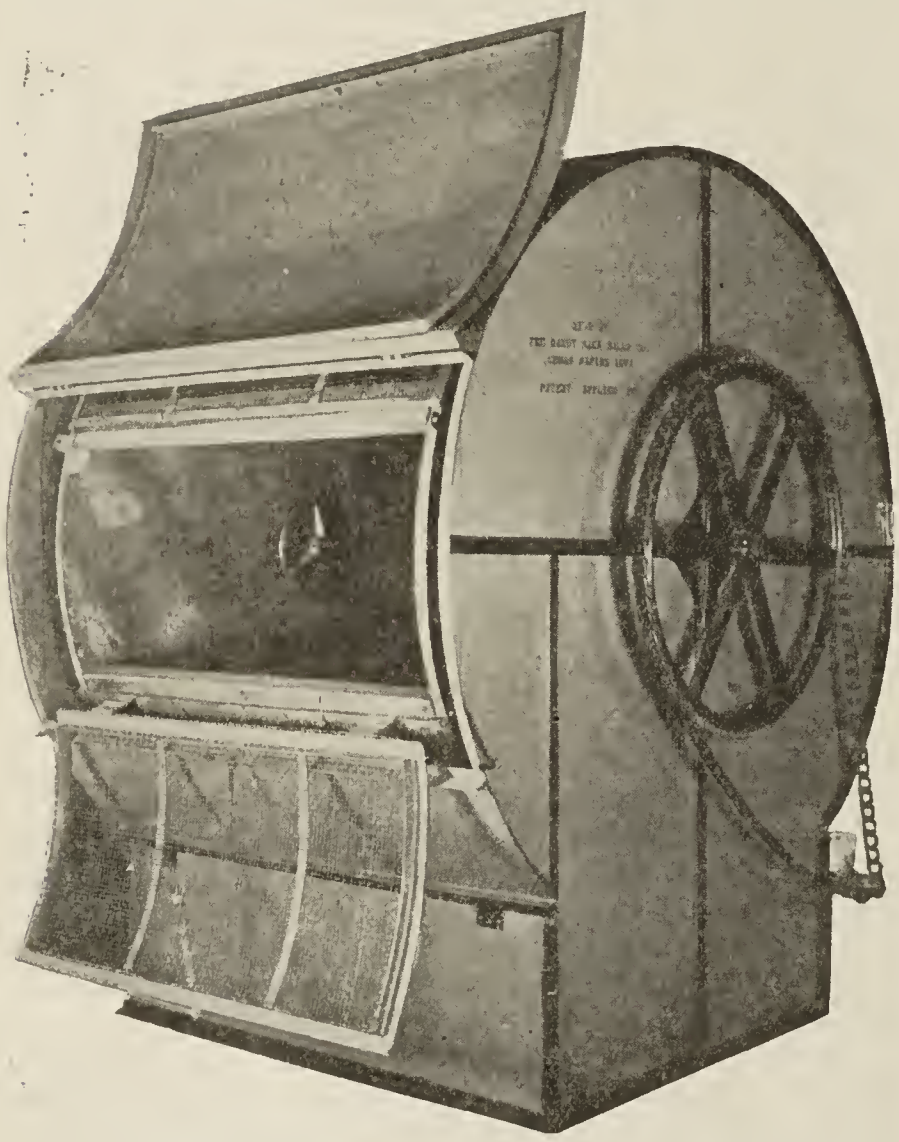
A Sack Cleaner for Road Jobs

By George M. Gross,
LaPorte, Indiana

Last spring I bought a sack cleaning machine for use on a fair sized road job at Hortonville, Wis. The results fully came up to my expectations. During the season we cleaned 100,000 sacks and secured from them approximately 200 barrels of good, first-class cement. This cement was actually tested and found to be first-class and then re-used in the work.

In addition to the cement saved, the reduced weight of the sacks made freight charges on the return shipment only about half what they had been with the uncleaned sacks. In fact, the bundles weighed on an average, when cleaned, 25 pounds per bundle of sixty sacks as against 50 to 75 pounds per bundle when not cleaned.

Another big item that was a big convenience on this job was that when the sacks had been through the cleaner, we had no trouble in reading the owner's name on the



The labor-saving, money-making sack cleaner

sack, which avoided the shipping of some of the sacks to the wrong place. On this job we were using seven brands of cement, and before we started using the cleaner, a good many errors were made in returning the sacks to the cement manufacturers.

We tried to keep as good a record as possible of the season's savings as compared to former seasons and find by comparison that we are fully $1,000 ahead on our sack account.

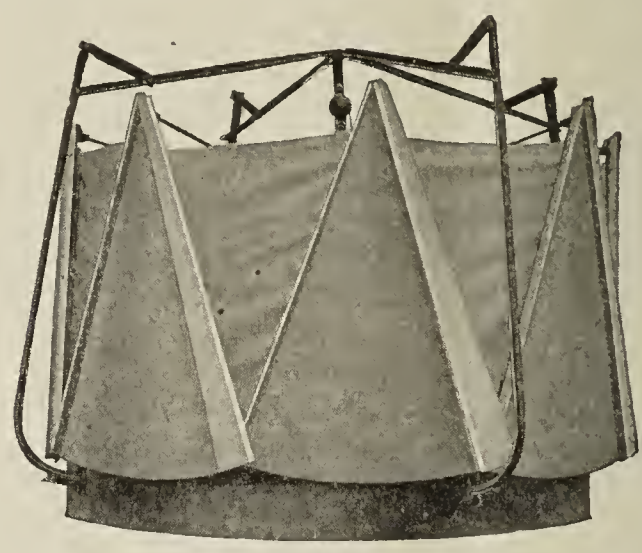
Metal Silo Roofs of all Styles

The building of a silo is not a complete job unless a roof is provided. The roof is as necessary as the walls in keeping the ensilage in the best possible condition. The roof should be as nearly self-supporting as possible so that all the space on the inside can be utilized. It should also be strong and serviceable so as to stand the conditions to which it is subjected.

A most complete line of sheet metal silo roof is carried by The Pierce Co., Waldheim bldg., Kansas City, Mo., and Steger bldg., Chicago. Two of their models are shown in the accompanying illustrations.

One of these is their self-supporting gambrel silo roof. The gambrel roof gives the silo more capacity because of the open unobstructed space that is left under the roof, which can be filled with ensilage. The filling is done through the dormer window shown.

The other type illustrated here is called the "Buckeye" Extension Silo Roof. It can be opened by a rope on the inside so as to give five or six more feet of

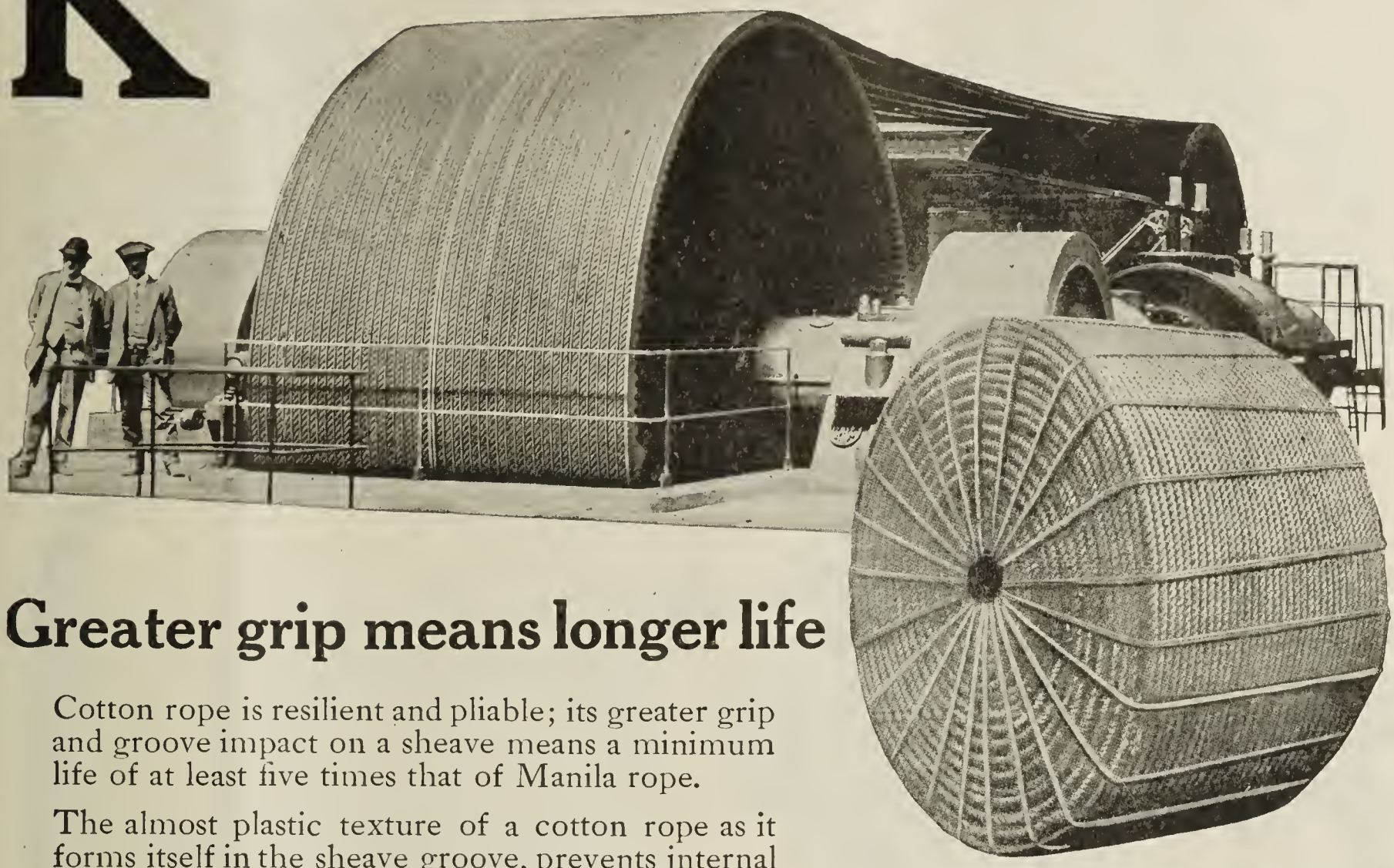


available silo space which can be filled and will pack down to give a full silo with no waste space. When the roof is closed it forms a tight, weather-proof covering in which there are no cracks or crevices for the wind or rain to enter the silo. It is made of triangular sections of galvanized iron conected by webs of the best tent drill so that the roof will open like an umbrella.

Reliable Contractors Equipment

American Cement Machine Co., Keokuk, Ia., is putting out a complete line of machinery in which every contractor will be interested. This line embraces mixers, pavers, hoists, backfillers, material elevators, pumps, air compressors, saw outfits and concrete carts. By being located at Keokuk it has access to water power cheap, a saving which is passed back to the consumer in lower prices. Over 6,000 contractors have installed the machines, which are giving satisfactory service. In concrete mixers the line embraces all types from the single bag, 1:2:4 mix, to the 4-bag skid mixer, suitable for large yardage jobs. In pavers the 2-bag mixer is the favorite. The pavers are equipped with the steel sectional chute which it is claimed has proven faster and more dependable than boom and bucket. These are gasoline mixers, which are said to be $10 per day cheaper than the steam mixers. A special line of hoists is cataloged, ranging from the gas or kerosene with double drum to contractors', reversing or non-reversing. Also a line of "all oak" material elevators, pumps for contractors and saw rigs and woodworkers. All who have not seen a copy of the "Boss" catalog should send for one.

KENYON COTTON ROPE



Greater grip means longer life

Cotton rope is resilient and pliable; its greater grip and groove impact on a sheave means a minimum life of at least five times that of Manila rope.

The almost plastic texture of a cotton rope as it forms itself in the sheave groove, prevents internal rubbing and wear of the yarn fibres—Manila rope wears both inside and out constantly.

Cotton rope is least affected by moisture which evaporates readily through the fibres and prevents internal mildew.

England has long recognized the superiority of cotton rope for rope driving; most English woolen and cotton mills, rope factories and steel working plants are using the Kenyon Interstranded Rope exclusively.

Kenyon Cotton Rope already enjoys a considerable sale in America, and it should be a matter of great interest to those using rope for the transmission of power to know that Dodge branches and dealers will distribute the product exclusively in this country.

A text book on rope driving, as developed in England in the last decade, is being reprinted for distribution, this very complete analysis of the subject should be in the hands of every engineer in America. We will send you a copy as soon as it is off the press if you say so.

DIAMETER OF ROPES

Velocity in feet per minute	1/2"	5/8"	3/4"	7/8"	1"	1 1/8"	1 1/4"	1 3/8"	1 1/2"
1000	4	6	9	12	15	19	24	28	34
2000	4 1/2	7	10 1/2	14	18	23	28	31	37
3000	5 1/2	8 1/2	12 1/2	17	22	28	32	36	40
4000	....	.....	14 1/2	20	26	32	36	40	46
5000	.....	.....	.....	23	30	38	43	48	55
6000	.....	.....	.....	.....	35	44	52	58	68
7000	.....	.....	.....	.....	.....	.....	62	70	84

The table above will be of interest to engineers—it demonstrates the advisability of using small ropes for high velocities rather than heavier sizes and larger size pulleys.

Cotton ropes, thus used, present a new and attractive method of group driving line shafting from an electric motor.

DODGE

Dodge Sales & Engineering Company

Distributor of the Products of the Dodge Mfg. Company and the Dodge Steel Pulley Corporation

General Offices. Mishawaka, Ind. **Works. Mishawaka, Ind., and Oneida, N. Y.**

Canadian Plant: Dodge Mfg. Co. Ltd. of Canada, Toronto and Montreal

Philadelphia Cincinnati New York Chicago St. Louis Boston Atlanta Pittsburgh Minneapolis Dallas Providence Seattle Newark

THE U. S. CHAMPION TILE

—Is a perfect and everlasting concrete roofing of artistic Beauty in any color desired—easily made and applied by anyone.

Our newly improved and patented tile machines are provided with a new device that makes automatically interlocks on both ends and sides of our tiles—an accomplishment of immense value for the roofing tile problem and characteristic for our tiles only.

Buy the U. S. CHAMPION TILE MACHINES for making FRENCH or SPANISH TILE. They help progressive builders and concrete products manufacturer cutting down the high building material cost besides giving large return from a small investment.

Write for description and prices

L. HANSEN CO.

3617 East 23rd Street, Kansas City, Mo.

the 3 essentials

Correct Mixing

Minimum Labor

Quality Products

First, the Kent insures correct mixing. It is accurate in measuring, correct in proportioning, and thorough and uniform in mixing the aggregates for QUALITY concrete blocks and tile—at low cost.

Second, the Kent is a labor saving machine and holds down your pay roll. It does its own measuring, proportioning, mixing, watering and discharging accurately. The Kent operates entirely by itself. Unlike batch mixers, it requires no man labor beyond the loading operation. Keep the hoppers filled with sand and cement and the Kent automatically will serve to your block machines charging platform a continuous stream of perfectly mixed and moistened material.

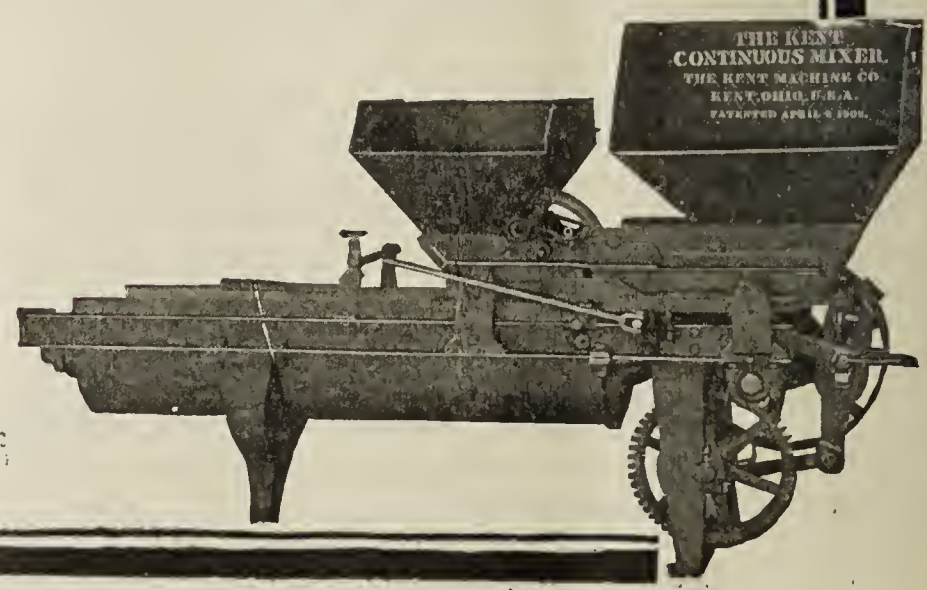
Third, the Kent insures Quality products because it is designed especially for concrete products factories. It is simple to operate and does away with the cumbersome hoisting cars, charging platforms, chains, cables and whatnot found on many of the old-fashioned batch mixers.

The three elements to successful concrete block and tile factory operations are inherent characteristics of Kent Continuous Mixers.

Write for Catalog

The Kent Machine Co.

Kent, Ohio



A BIG DEMAND FOR THESE VAULTS
—PROFITS LARGE—

With our Adjustable Steel Molds you can easily make any size of the Automatic Sealing Burial Vault at an exceedingly low total cost.

When once they are seen and used in a community the Automatic Sealing Burial Vaults come into instant demand. They are far superior in every way to any other cement or steel vaults.

The manufacturing of these Automatic Sealing Burial Vaults with our Adjustable Steel Molds is a big money making opportunity. The first ten vaults you sell will more than pay back your entire investment—materials, molds, time, etc., etc.

Write us for complete particulars.

Automatic Sealing Vault Co.
216 E. River St. PERU, IND.

Adds Beauty to Usefulness

THE Commercial Motor Car Co., Portland, Oregon, built this handsome yet thoroughly serviceable garage by day labor. It is of poured concrete, stuccoed with Medusa Stainless White Cement.

Its clean, fresh effect will be *permanent*—Medusa White does not stain nor discolor with age, and if it becomes soiled, accumulated dust or soot may be readily scrubbed off.

Booklets will be gladly sent upon request.

THE SANDUSKY CEMENT COMPANY
Department E Cleveland, Ohio
Ask to have your name placed upon the complimentary mailing list of "The Medusa Review"

MEDUSA Stainless White Cement

Brick-making Made Practical and Profitable with

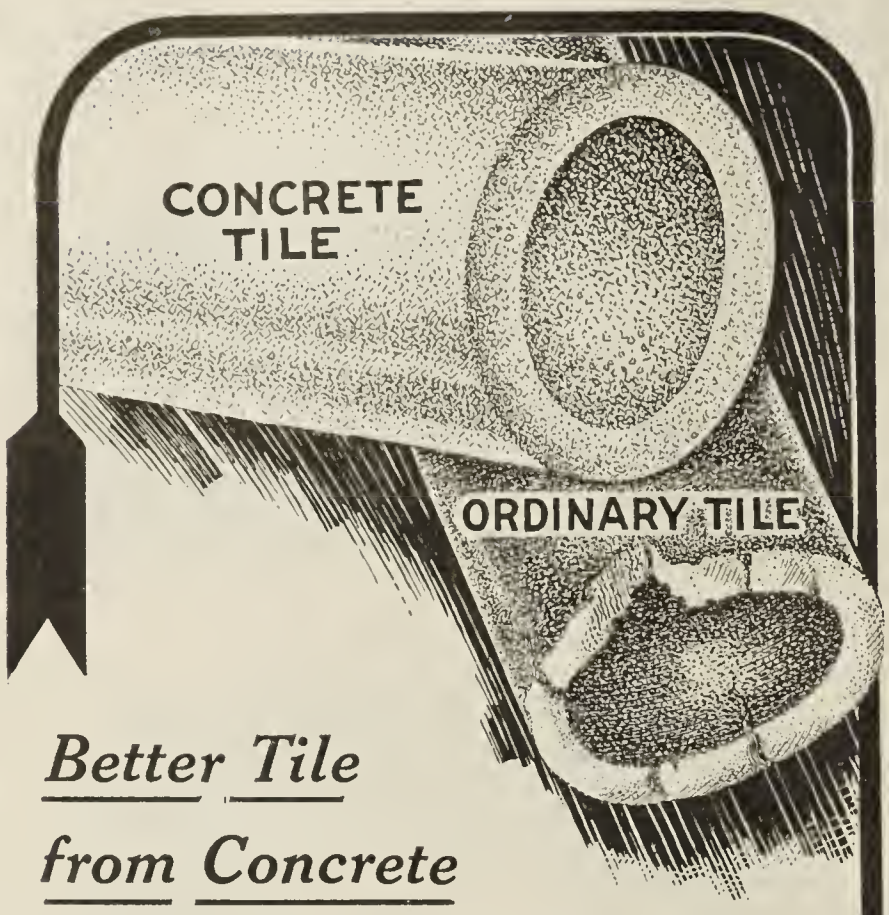
The Helm Brick Machine

Bricks and blocks produced on a HELM PRESS are the finest looking and the most permanent, because the machine comes down with a pressure of 40 tons on the medium wet concrete, which welds all the elements of these materials so as to be able to resist fire, moisture, wear and tear.

Another reason why you should buy a Helm Machine is that your production is unlimited—you can turn out 15,000 brick or 1,500 24-in. blocks in a day if you wish.

And finally, the Helm Press is built to last—to produce for you year after year without complaint, without repairs.

The Helm Brick Machine Company
761 Mitchell St., Cadillac, Mich.



Better Tile from Concrete

CONCRETE improves with age. Unlike any other tile, the longer concrete tiles remain in the ground, the harder and more serviceable they become. This fact has been demonstrated by scientific bodies, throughout the world. There are fewer broken ends and cracked tiles, when they are made from concrete. They lay up closer, and make a better job, because they are more uniform in shape and size.

The best grade of concrete tiles can be produced with the Cardiff Machine at the rate of 400 to 800 per day, employing two men, or a man and a boy.

Tamping Method Superior

The Bureau of Standards has shown that the tamping method, that principle employed in the Cardiff, is superior to the rotary or pressing method of moulding.

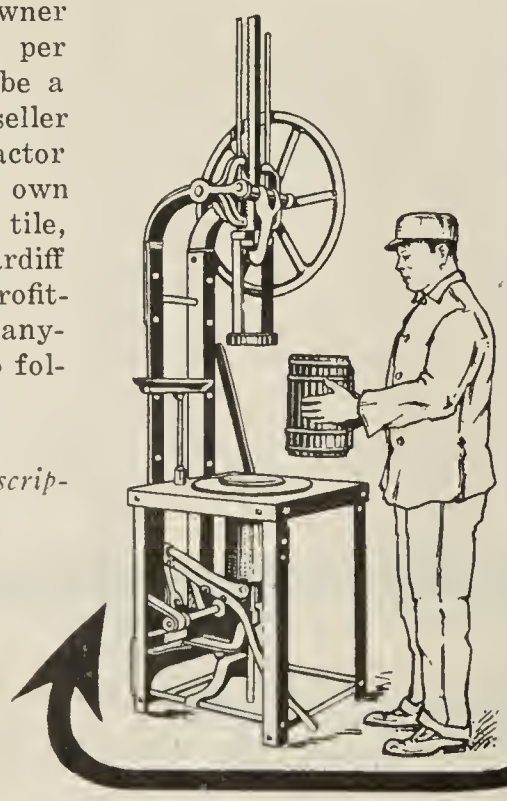
Cardiff Cement Tile Machine

will make its owner from $50 to $100 per week, whether he be a manufacturer and seller of tile, or a contractor or farmer using his own product. Cement tile, moulded in a Cardiff Machine makes a profitable side line for anyone in a position to follow it.

Write for full description and prices

Leavitt Manufacturing Company

370 Griggs St., Urbana, Ill.



Concrete Roads must be reinforced

It is demonstrated beyond doubt that to make concrete roads proof against heavy motor traffic, weather and time, a fabric of steel must be incorporated in the concrete.

Several great states have so ruled.

American Steel & Wire Concrete Company's Reinforcements fulfills every engineering requirement.

Send for our book on road building.

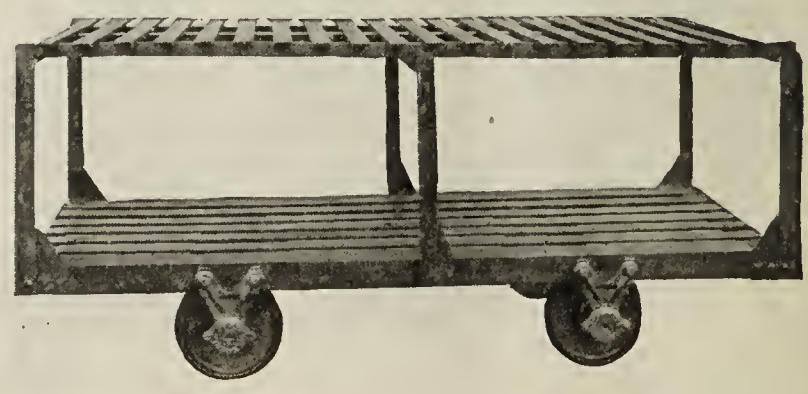
Chicago
New York
Cleveland
Pittsburgh
Denver

Conco Cars

are fast becoming the popular car among tile and block makers because of their durability, convenience in loading, light weight and moderate price.

Let us solve your hauling problems.

H. D. CONKEY & CO.
Mendota, Ill.



SAND PUMPS

That pay the largest dividends per dollar of investment.

"The Pump That Makes The Money."

This Pump is all that is implied in the name

LIGHTNING

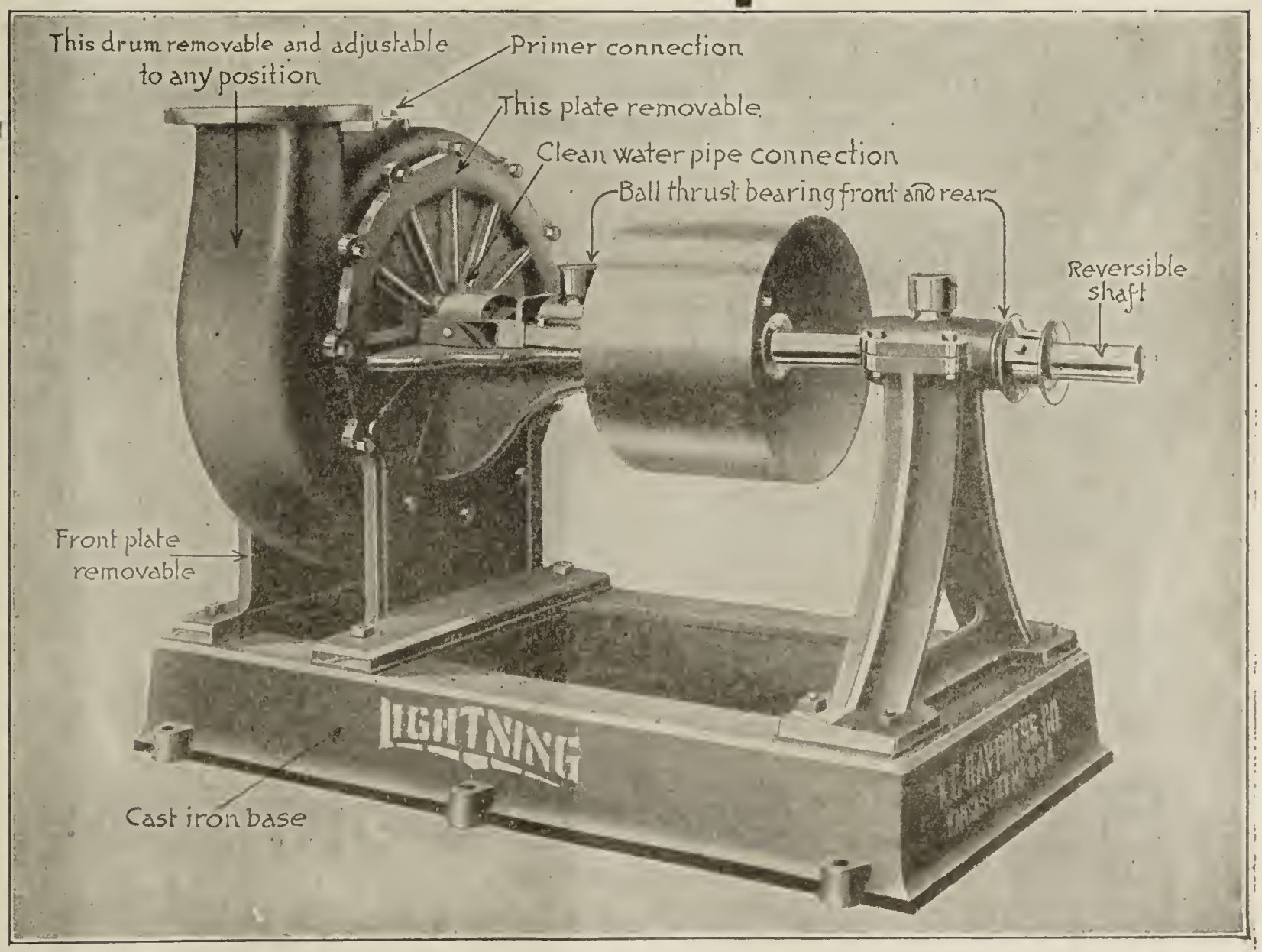
Its rugged construction and Simple operation assures maximum efficiency in operation at all times.

It is easy to adjust and easy to replace parts. Thousands in successful operation are striking endorsement of their dependability.

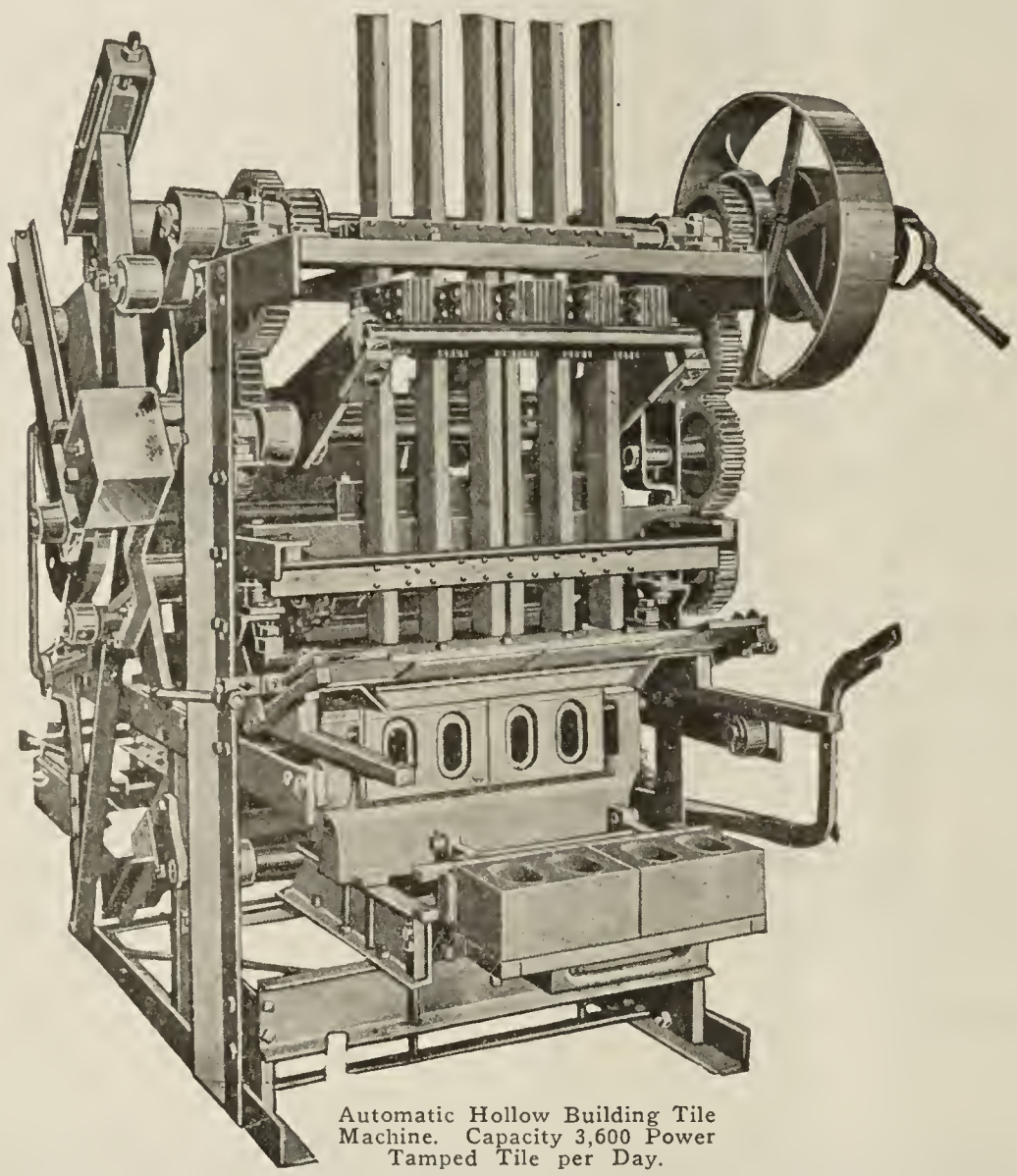
KANSAS CITY HAY PRESS & TRACTOR COMPANY

KANSAS CITY, MISSOURI

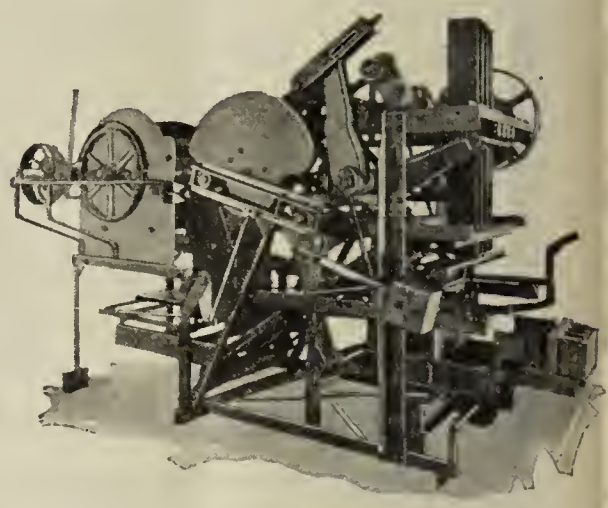
THE PUMP OF SIMPLICITY AND STRENGTH



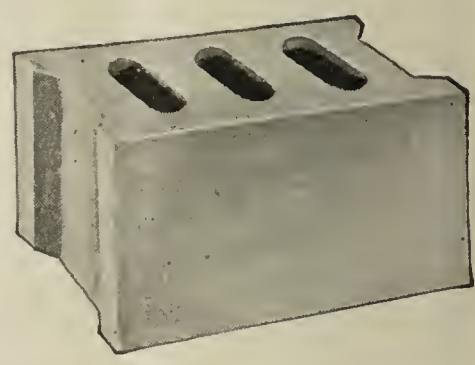
Besser Large Capacity Automa



Automatic Hollow Building Tile Machine. Capacity 3,600 Power Tamped Tile per Day.



Single Automatic Block Machine—Capacity 1,800 Power Tamped Blocks per Day.



THIS IS THE

Get your equipment now before the late-season rush begins. Lay your plans while there is time to investigate the kind of equipment you want—time to get that equipment—time to install it to obtain the maximum of output at the minimum of labor costs. Be ready to meet the demand when it comes. Our Engineers are ready to help you.

ABOUT TAMPING

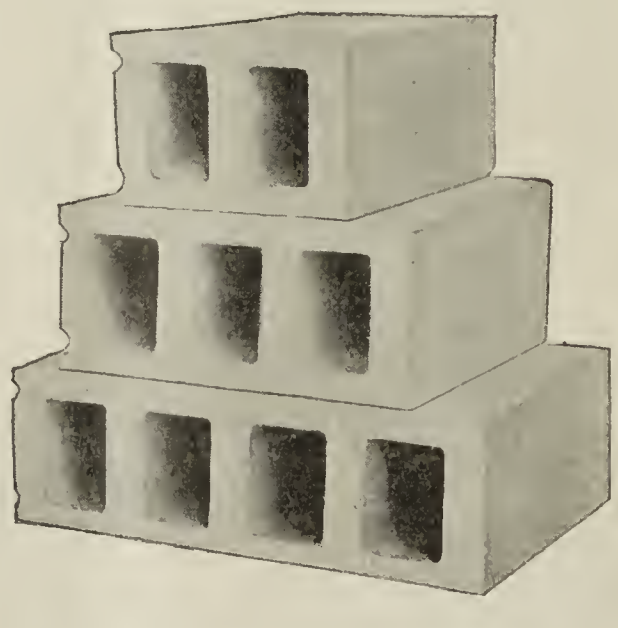
Powerful tamping is a feature of all Besser power machines. Concrete is discharged into the machine supply hopper, automatically elevated and distributed into the mold box under the tampers. Each tamper strikes with an impact of over 1,000 lbs. They drop simultaneously, compacting only 1¼ lbs. of concrete with each blow on the block machine, and ⅘ lb. on the tile machine. Charging and tamping is repeated **eight times.**

Next, surplus concrete is removed, a finishing plate moves in over the mold box, and the tampers descend, striking three blows with their combined weight, still further compacting the block or tile to maximum density.

Not a lever to be pulled in any of these operations—**it's entirely automatic.**

Larger profits without raising prices—more business—better satisfied customers—have been the experience of Besser owners. Why not make it your experience? Read what some of them think of BESSER MACHINERY.

Better own a BESSER than compete with one.



THE BES

Single Automatic Block Machine for standard 8x8x16", 20" and 24" blocks.

Double Automatic Block Machine for standard 8x8x16" block.

No. 1 Automatic Brick Machine. Daily capacity, 60,000 tamped brick.

No. 2 Automatic Brick Machine. Daily capacity, 30,000 tamped brick.

Double Automatic Machine for light weight hollow building tile in sizes 5x8x 12" and 5x12x12".

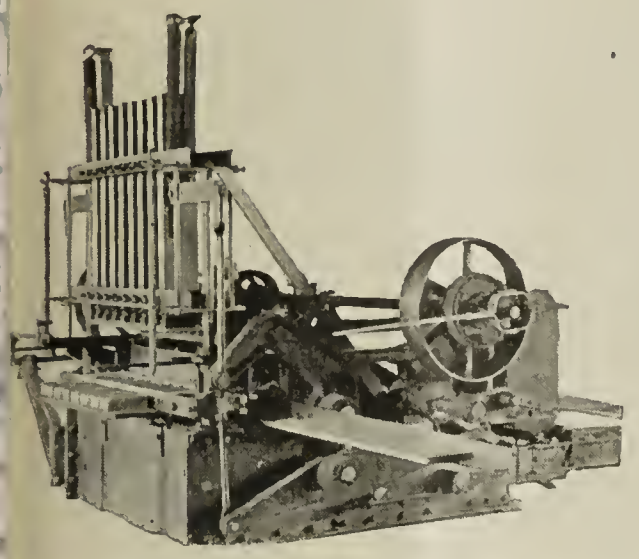
Double Automatic Machine for 4", 5", 6" 8x8x12" hollow partition tile.

No. 1 Drain Tile Machine for diameters 3 to 16" and in 12", 18" and 24" lengths.

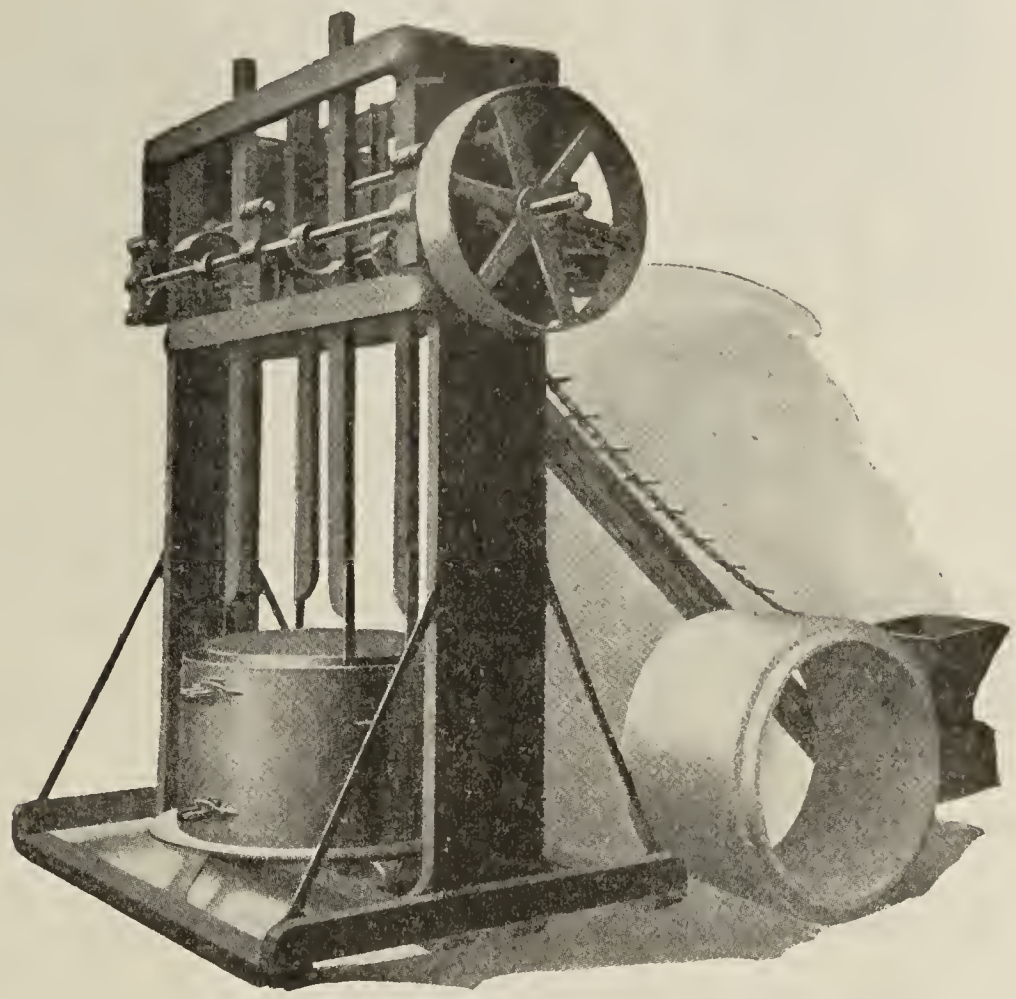
No. 2 Drain Tile Machine for diameters 3 to 12", in 12" lengths.

Besser Sales Company, 1302

c Concrete Products Machinery



1 Automatic Brick Machine. Capacity 60,000 Power Tamped Bricks per Day.



No. 3 Automatic Drain and Sewer Pipe Machine. Capacity 600 24 in. Diameter Pipe per Day.

IME TO PREPARE

e BESSER LINE is complete. It contains everything for the production of concrete products—from the hest grade hand-operated machine to the speediest, absolutely automatic power machine of largest capacity. ıatever the products that you want to manufacture, whatever the equipment you may have been considering—ter first learn what BESSER has to offer.

ER LINE

3 Power Tamp Drain Tile and Sewer ipe Machine for diameters 6 to 36", ıd in 24" and 30" lengths.

ıent Silo Stave Machine for 2½x10x30" lapted to 2" to 3" thickness—length 1-32".

in and Sewer Pipe Molds.

nney Block Machine.

ıd Brick Machine.

d Block Machine.

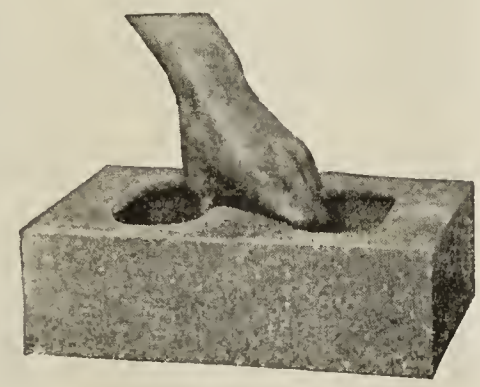
ıd Hollow Building Tile Machine—4 odels for special sizes and shapes.

d Drain Tile Machine.

ı. ft. Batch Paddle Mixer.

tinuous Mixer, capacity up to 100 cu. ls. per hour.

, pallets, motors, belting, everything r the complete products plant.



WHAT BESSER OWNERS SAY:

Mr. J. A. Gibson, 199 Rano Street, Buffalo, N. Y.:
"I purchased one of your 16-in. machines nearly two years ago. I do not believe there is any block machine on the market today that can equal it in speed or quality of block."
Mr. Clarence V. Bertsch of Bertsch Brothers, Richmond, Ind.:
"Referring to our Besser Block Machine: We are well pleased with the work that it is doing as to quality, speed, convenience, and especially as to the amount of labor it saves compared to the method we employed previously."
Jas. D. Pasquale, Vineland, N. J.:
"We have used a Besser for almost three years, and have found it entirely satisfatory, which has enabled us to keep up with enormous demands for cement block."
A. F. Schaefer, of Schaefer Bros., Rochester, N. Y.
"We believe they are the best built block machines on the market today. We have tried out three or four different makes of machines, and would certainly not hesitate to recommend the Besser Machine to anyone." Scores of others give similar reports.

1st Street, Alpena, Mich.

This house was built more than ten years ago with "Perfect" Products.

Get the house building business of your town with $100 Profit Daily from

PERFECT Concrete Block and Brick Making Equipment

Material prices will be down far enough to start building going—especially house-building.

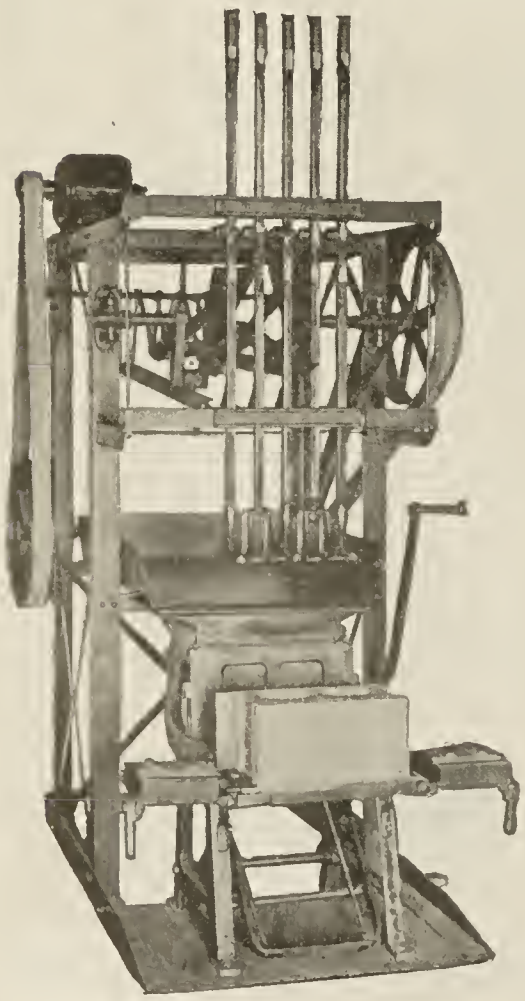
But lumber will never come down far enough to bother a man who is making concrete blocks or brick.

Now is the golden opportunity for the concrete products manufacturer, if he moves quickly enough.

—if he starts **now** to equip his plant to turn out more block and brick than he ever dreamed before of selling.

—if he gets quick-action, repairless, reliable, automatic machines for making his products at low factory cost, in big quantities.

—if, in short, he will investigate "Perfect" Block and Brick Machines, install them, get them operating, make up a reserve stock and be ready to handle orders when the flow starts—and it'll start extra early this spring.



Block Machines

The "Perfect" unit shown at the left is gearless, quiet running, fast. It tamps the block automatically. The block machine may be purchased alone for hand operation.

Brick Machines

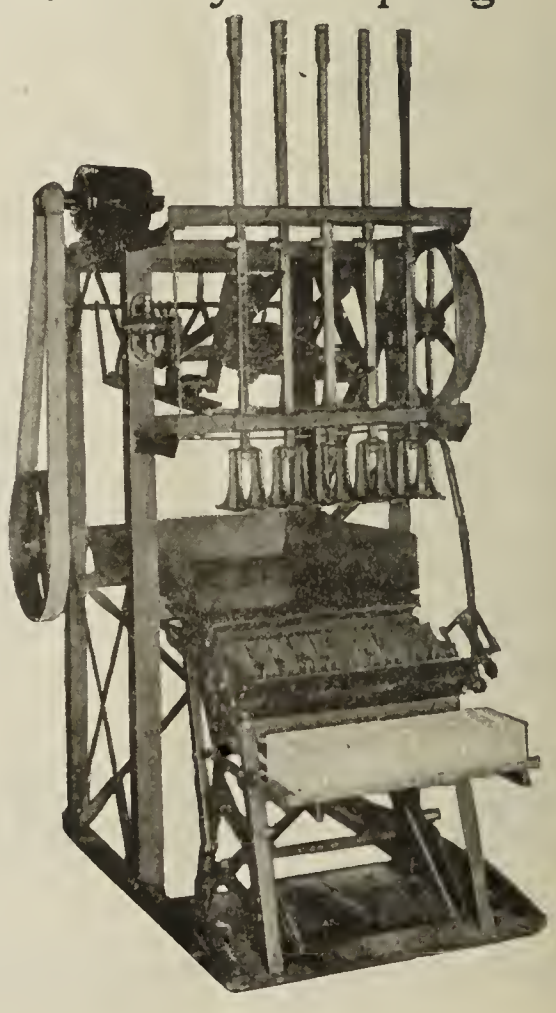
We show at the right the "Perfect" Brick Machine equipped with power tamper. Makes strong, hard, uniform brick, standing the tests of the best clay brick. Buy the hand machine by itself if you don't want a big output.

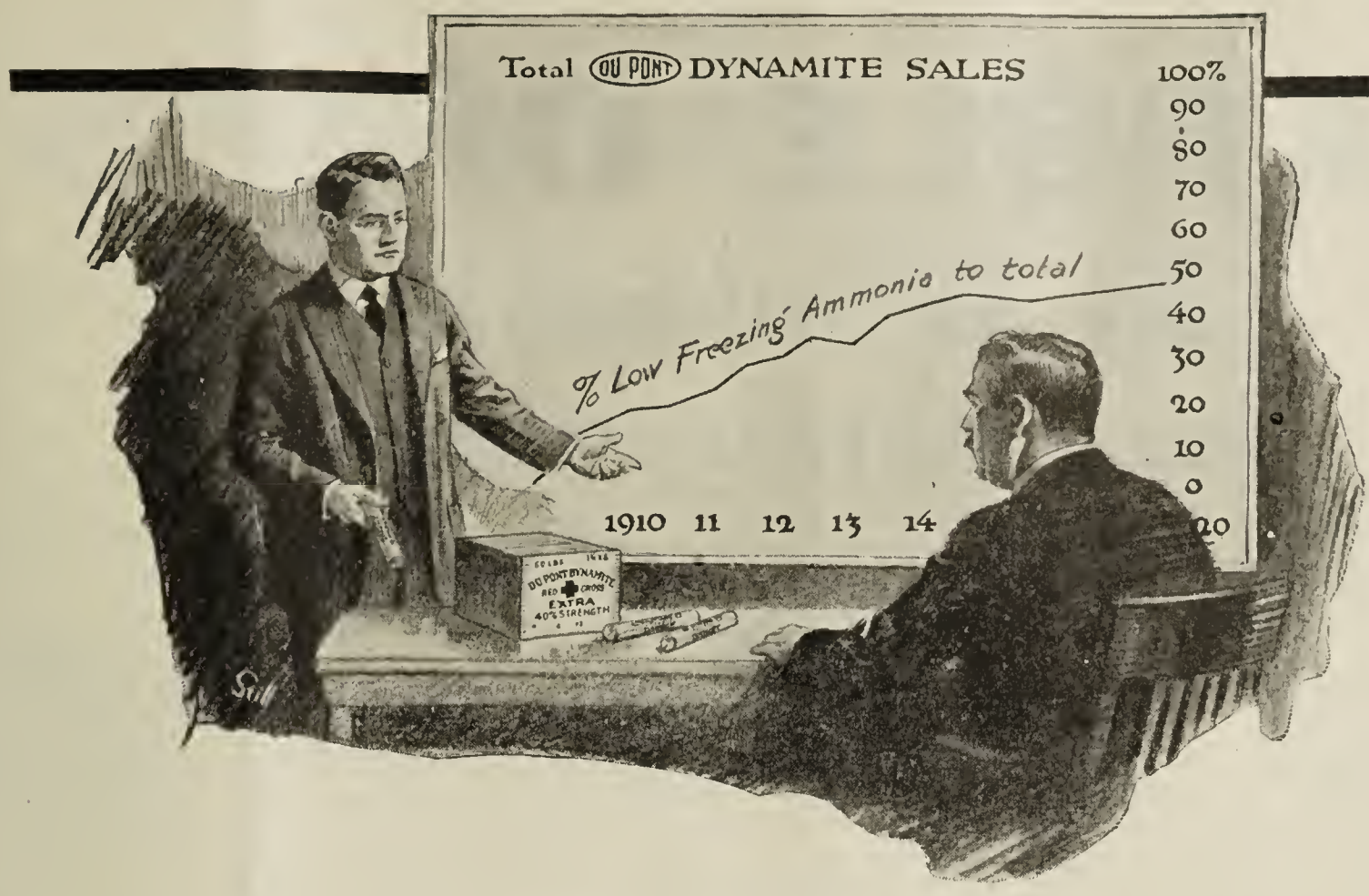
We will exhibit our full line at the Northwest Concrete Show, St. Paul, Minn., Feb. 22-25.

Write us today for descriptive circulars.

The Wert Manufacturing Co.

547 Railway Exchange Bldg.
CHICAGO





FIRST in the Development of Lower-Cost Explosives

THE history of the Explosives Industry will show that this company has always been a leader in the production of powders that will do the work at a great saving over those formerly used. Our introduction of Low-Freezing Ammonia Dynamites in 1907 was a long step in this direction. Explosives users were quick to appreciate the value of this low-cost powder. Its sales increased from 20,000 lbs. in 1907 to 45,000,000 lbs. in 1919.

The saving to Du Pont customers alone amounts to over $350,000 per year.

It is such work as this that causes so many of the country's greatest mining and engineering concerns, year after year, to place in our hands the entire fulfilling of their explosives requirements. For no one questions the day-in-and-day-out uniformity of Du Pont quality.

E. I. DU PONT DE NEMOURS & CO., Inc.

Sales Department: Explosives Division

WILMINGTON, DELAWARE

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Duluth, Minn.
Huntington, W. Va
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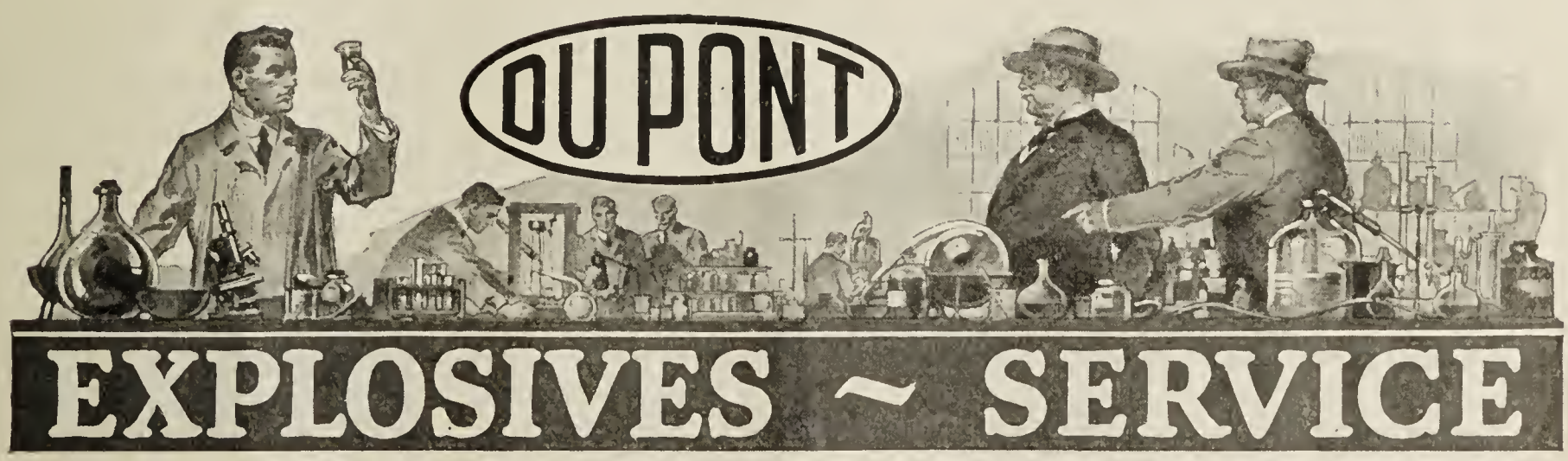
Juneau, Alaska
Kansas City, Mo.
New York, N. Y.
Pittsburgh, Pa.
Portland, Ore.
St. Louis, Mo.
San Francisco, Calif.
Scranton, Pa.
Seattle, Wash.
Spokane, Wash.
Springfield, Ill.

Du Pont Products Exhibit
Atlantic City, N. J.



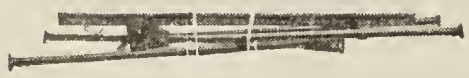
MARBLE CHIPS

At Wholesale

R. V. REYNOLDS CO.

1409 Railway Exchange : : Chicago, Ill.

A Complete Steel Trestle OPEN— Ready for Use.



CLOSED—For Storing or Transporting.

ECONOMY STEEL SCAFFOLDING

is being used by a number of leading Chicago contractors, such as Thompson Starrett Co., R. C. Wieboldt, Blome Sinek, E. W. Sproul & Co., Math Rauen Co., Gerhardt Meyne and many others, who will gladly recommend them to every contractor as a good asset in equipment.

The illustration is of the Mason Horse 4 ft. 6 in. high and 5 ft. 0 in. wide which weighs but 60 lbs., they are sturdy in construction and their compactfulness when folded makes them very easy to handle, transport or store.

A TRIAL ORDER WILL CONVINCE YOU THAT THEY ARE A NECESSITY.

Price $6.00 each, F. O. B. Chicago.

ECONOMY SCAFFOLD CO.

4611-19 West Fulton St. CHICAGO, ILL.

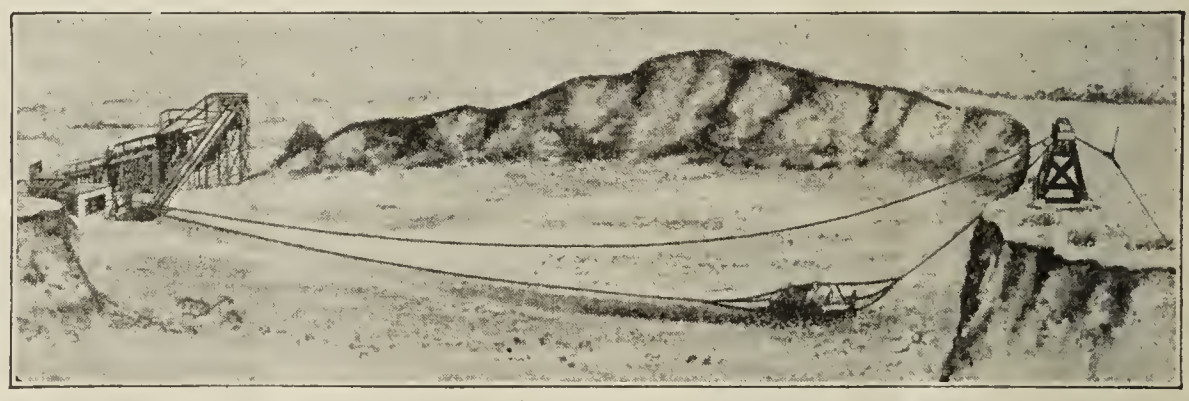
SAUERMAN BOTTOMLESS POWER SCRAPERS ARE LABOR-SAVERS FOR SMALL GRAVEL PITS

Conservative claims for the smallest sizes of Sauerman Bottomless Power Scrapers, based on the statements of contractors and county road commissioners who are using them, are that a Sauerman scraper operated by one man will displace from 6 to 15 teams and slip scrapers. The larger sizes of Sauerman scrapers are considered by the commercial gravel producers who use them as being the equal of a small steam shovel with the added advantage that they will not only dig, but also convey the sand and gravel to the plant.

One road superintendent in Michigan who installed one of our ⅓ cu. yd. scrapers in the county gravel pit last Summer, writes in to say that it is saving the county $40.00 per day while doing the work that formerly called for a half dozen teams and scrapers.

A Wisconsin sand and gravel producer chose a Sauerman scraper in preference to any other type of equipment when he opened his first gravel pit about six years ago. Today he owns and operates four gravel plants and the excavating and conveying equipment is the same at all—Sauerman Bottomless Power Scrapers.

The many advantages of this one-man operated, combined excavator and conveyor are explained in our Pamphlet No. 10, with illustrations and diagrams of actual installations. Write for this booklet today.



Typical installation of Sauerman Power Scraper for hillside gravel pits.

Also, for Handling Coal

We manufacture a special type of bottomless power scraper (shown below), that is extensively used for storing and reclaiming coal and similar loose materials. Full description on request.

Sauerman Bros., 1139 Monadnock Block, Chicago

Also Manufacturers of Sauerman Dragline Cableway Excavators

SELECTED WHITE SAND

UNEXCELLED FOR

Facing Concrete Blocks, Ornamental Concrete Stone, Hard Plaster, Finishing, Exterior Plastering, Roofing, Stone and Marble Sawing, etc.

Prices, Freight Rates and Samples on Application

Shipped in Paper Lined Box Cars

Small Shipments in 175-lb. Bags

Ottawa Silica Company

OTTAWA, ILLINOIS

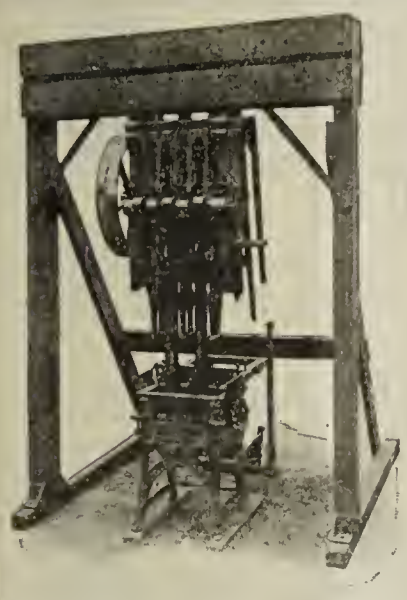
CONCRETE SEPTIC TANKS

—an Independent Business

Install Sanitary Septic-Tanks. Every home outside of a sanitary sewer district needs it. A one-piece Tank Installed in Place; Self-Cleaning Vault. Large profits, quick returns. Every customer advertises the Septic Tank for you. Only a small investment required.

M. J. GRIFFITH, Inventor

Office 313 E. Tus. Ave. **Barberton, Ohio**

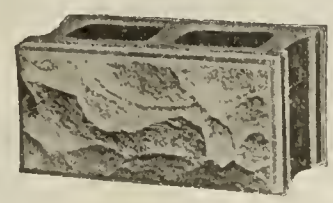


Ideal

The Ideal Concrete Machinery Company

1318 Monmouth Avenue **CINCINNATI, O.**

Increase and improve your production with power equipment. With Ideal Machines you make all types and designs of blocks. Equip your plant with machines that are a proven success and not an experiment.

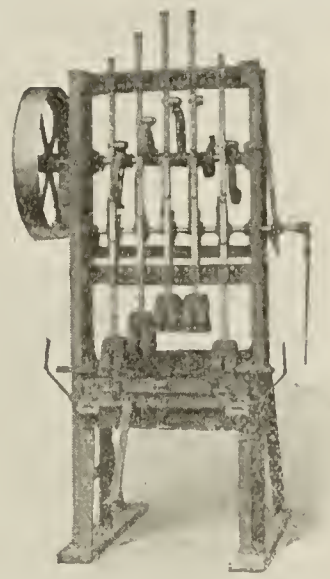


Block Machinery
Catalog No. 35

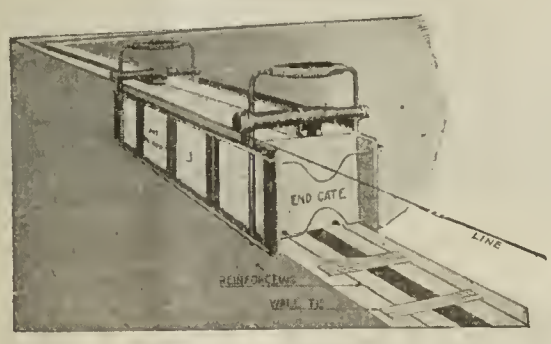
Ornamental Mold
Catalog No. 30

Mixers
Catalog No. 33

Brick Machines
Folder



Build the Hollow Wall Way



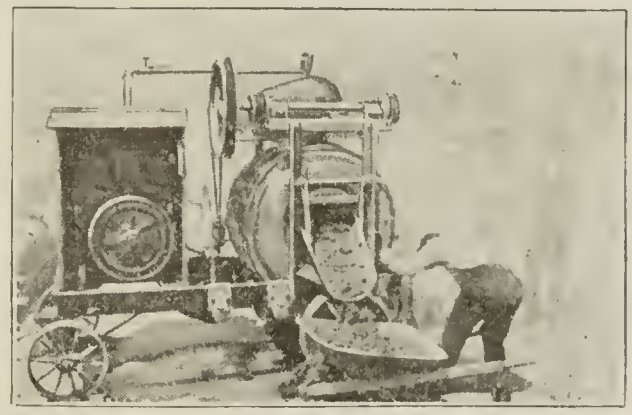
Like a thermos bottle—warmest in winter—coolest in summer. Fire-proof—everlasting.

Cheapest, best and most perfect way known to the building world.

The reason the most wall can be built for the least money with our forms is—because they are STRONGEST—LIGHTEST—SIMPLEST and MOST PERFECT, and the price of a complete set can be saved on one small job. Send for literature.

The Universal Cement Mold Co.

North Milwaukee **Wisconsin**



THE *Atlas* MIXER

Represents the best established practice in Concrete Mixer Construction.

Its dependability and simplicity commends it to the contractor who appreciates the importance of uninterrupted service.

The Atlas is made in various sizes and styles. Let us mail you our catalogue.

Send for it today—NOW

ATLAS ENGINEERING CO.

3023 Lisbon Ave. **Milwaukee, Wis.**

P. S.—If you are interested in material handling equipment, let us mail you our ATLAS Wagon Loader, Box Car Loader, Car Unloader, Belt and Bucket Conveyor and Portable Storage Bin catalogue. The catalogue is yours, simply ask for it.

WATER

WE-FU-GO AND SCAIFE

PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

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BELTING

"V-B" Balata
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(Canvas Stitched)
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(Impregnated Solid Woven)

Write for Prices, Discounts and Samples

VICTOR BALATA & TEXTILE BELTING CO.

Factory: Easton, Pa. Main Office: 38 Murry St., New York
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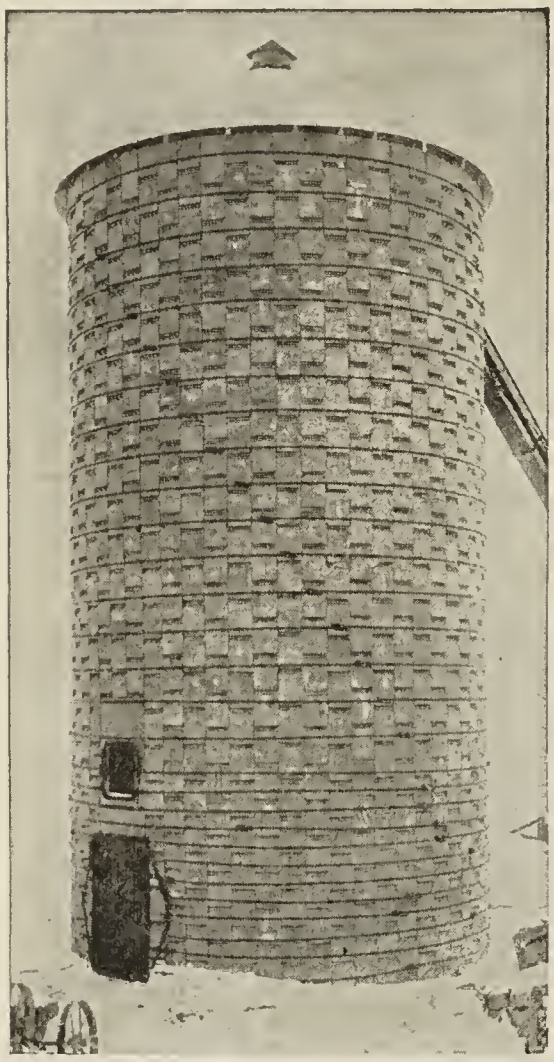
CONVEYOR BELTS A SPECIALTY

THE IREY SUCCESSFUL AND ECONOMICAL METHOD OF CONSTRUCTION



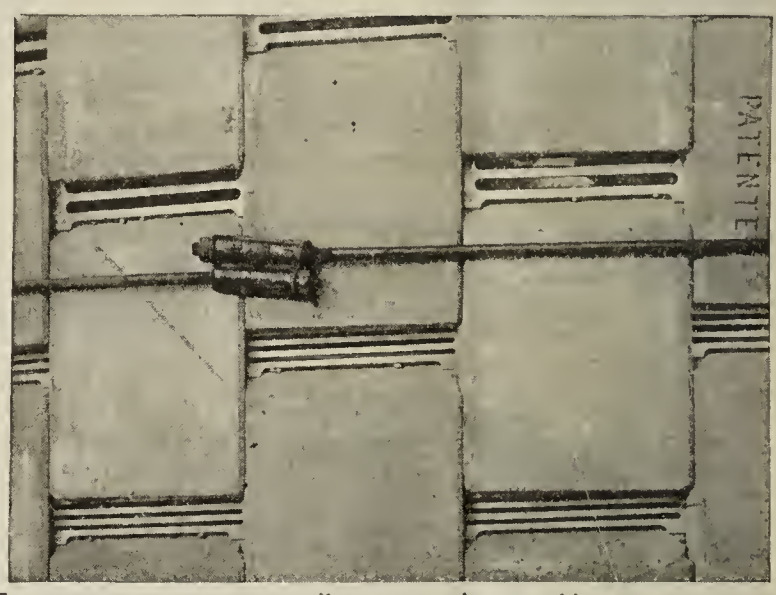
Irey cement stave corn crib on the farm of W. W. Walters, Wiota, Iowa—a fireproof, ratproof, and permanent structure.

Gives every rural contractor an opportunity to take advantage of the large demand for better Corn Cribs. Every farmer is a prospect for a concrete crib.

THE IREY PATENTED VENTILATED CONCRETE STAVE CORN CRIBS

are so built as to admit air and exclude rain and snow.

Making the staves is simple. Erection rapid. Every farmer is a booster. Any concrete man can establish a good paying business manufacturing and erecting these cribs. Investigate our proposition. Write for details.



Irey cement stave corn crib construction combines permanence and ease of operation with ample circulation through the contents.

CONCRETE PRODUCTS CORP.

WEST LIBERTY, IA.

For FIRE BRICK and DUST

Specify

CRESCENT QUALITY

THE UTMOST IN
FIRE CLAYS

CRESCENT REFRACTORIES CO.

Curwensville, Clearfield Co., Pa.

"HERCULES SOLID WELD"
STEAM SHOVEL CHAIN

The Chain that puts the SHOVE in Steam SHOVELS

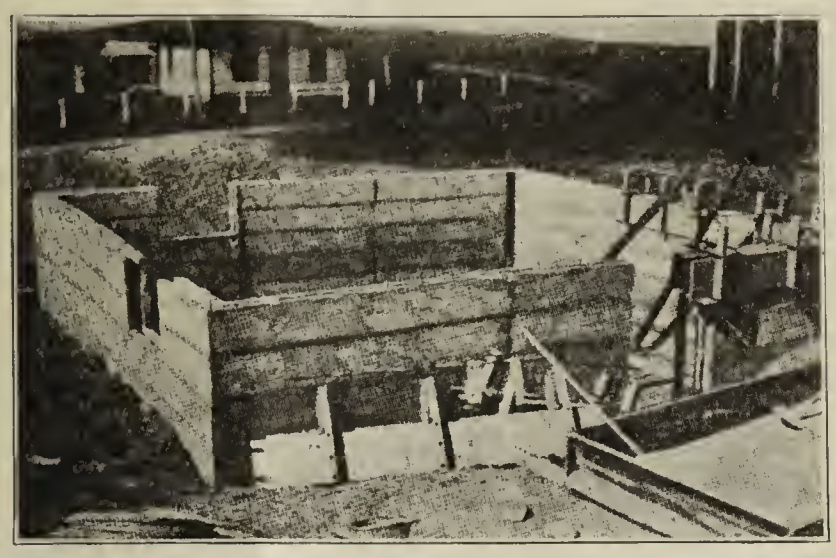
MADE ONLY BY

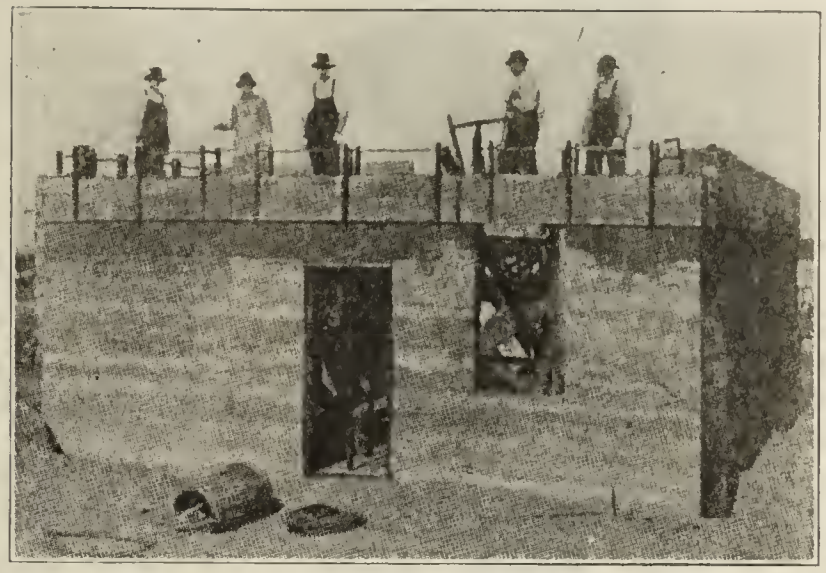
THE COLUMBUS McKINNON CHAIN CO.

General Offices: COLUMBUS, OHIO

FROST HOLLOW WALL FORMS

ADJUSTABLE TO ANY KIND OR SIZE OF BUILDING





With our forms you can build a double wall, reinforced concrete building to compete with the cost of frame construction.

Moisture-proof, fire-proof, repair-proof walls. Save paint, lath, time and labor to you. Save repair, fuel and insurance to the owner.

Forms adaptable to any size building, adjustable to any thickness wall. Built of poured concrete, reinforced three ways with continuous dead air space makes the most desirable method of building construction. Simple to use, easily adjustable. No skilled labor required. Method has been tried and proven.

Write for complete description of method and its operation, photos showing work done, and costs.

HOLLOW CONCRETE WALL CO.

H. T. FROST, PRESIDENT — MITCHELL, SOUTH DAKOTA

for facing concrete work

FOR the stucco suburban home—the modern public utility plant and factory—the bank and office building—first call is for Middlebury Terrazzo for facing concrete work.

Middlebury Terrazzo has all the appearance of solid marble—with all its advantages and at a material saving in price.

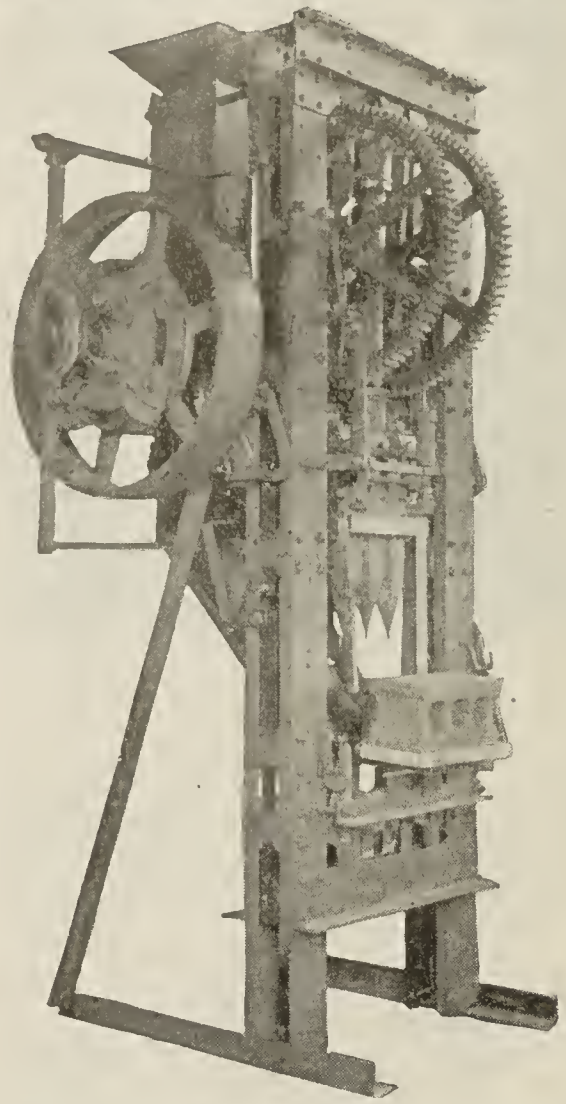
Made from Middlebury White and Crême Statuary Marbles, it is furnished, carefully graded to size, in either dust, No. 1, 2 or 3.

Send today for free samples and prices

Middlebury Marble Company

BRANDON, VERMONT

POST ECONOMY PUNCH



Introducing an absolutely new and original method of manufacturing concrete blocks. ALL AUTOMATIC. Each stroke of the plungers makes and delivers a complete block—a block which is dense, true and easy to lay. A guaranteed output of over 2000 blocks per day with four men. No other equipment will give you this production per man.

We also manufacture the following well known machines:

The Hobbs Down Face Block Machine

The Anchor Continuous Air Space Block Machine

The Anchor Automatic Tamper made to operate over any type of block, brick or stave machine.

The Anchor Batch Mixer—a mixer designed for concrete products plants.

Let us tell you more about this reliable line of equipment.

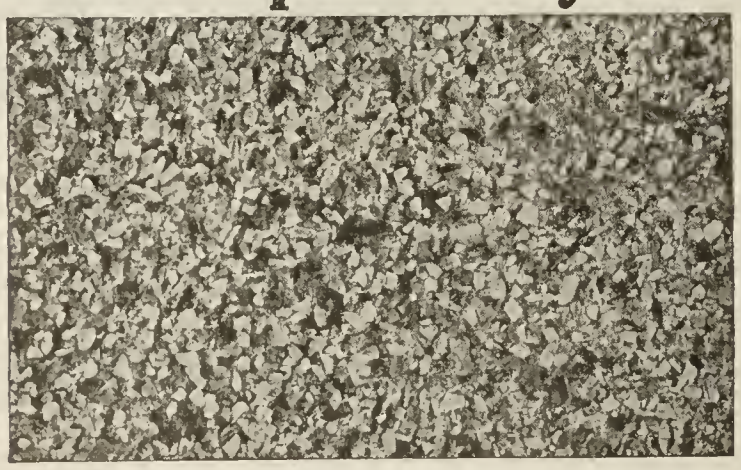
The Anchor Concrete Machinery Co.

Home Office: Rock Rapids, Ia. Branch: Columbus, O.

Concrete Blocks, Bricks Building Trim, Posts, Ornamental Work, Etc.

WHEN FACED WITH

Mica Spar Crystals



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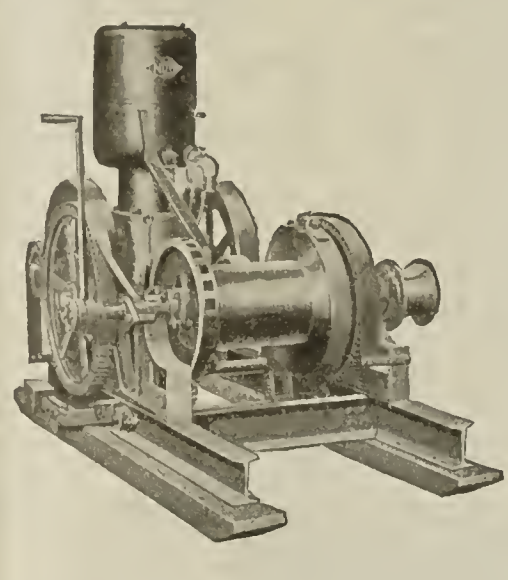
SPARKLING GRANITE

Beautiful, Artistic and Everlasting

Made in six scientifically milled sizes, extremely hard, sharp and free from dust. Insures strength and beauty. Booklet "Micaspar and How to Use It," with free samples mailed on request.

Crown Point Spar Company, Inc.

663-665 BROADWAY NEW YORK



Prepare!

Labor is more plentiful and materials are lower than they have been for a couple of years.

This is going to boom early spring building.

The contractor who is ready to start with plenty of equipment is the one who will profit.

Look over our catalog and make up your list. Get our prices now if nothing more.

If you do not have our catalog send for it.

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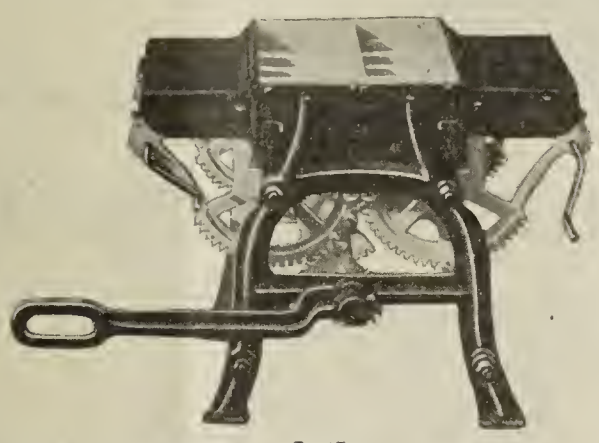
Contractors, Mill and Railroad Supplies

440 N. Wells St. Department 38 CHICAGO



Double your daily output with

DOUBLE-SPEED

Brick and Block Machines

Now is the time to increase the capacity of your block plant—turn out the maximum number of wall feet per day, while the demand for building materials is at its highest.

Block Output

Our Double-Speed Block Machine makes in each operation: 2 hollow blocks, 2 silo blocks, 2 solid blocks, 2 slabs, 4 half blocks, 2 water table slabs, 2 return ends, 2 chimney blocks, or 2 porch pier blocks.

Brick Output

Double-Speed Brick Machine makes 16 brick at each operation, 8 brick being delivered at each side of the machine.

Double Speed Tamper

This power tamper gives our block machine a capacity of 1,500 blocks per day and speeds the brick machine up to 15,000 brick per day. Roller-cut-off removes surplus material from mold box and finishes the top of the product. The block and brick are tamped rapidly and vigorously, resulting in a dense, strong product. Machine consumes little power and is practically fool-proof.

Write for block and brick machinery catalog, Dept. A,

Wood Bros. Thresher Co. Des Moines, Ia.

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OF

SILO HARDWARE

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SPREADERS LUGS CHUTES, etc.

REINFORCING BARS

FOR EVERY TYPE OF CONSTRUCTION

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Avail yourself of Pierce Service. We can make prompt shipments on all items of silo hardware, on all orders large or small, from our conveniently located warehouses, at prices that are right.

THE PIERCE CO.

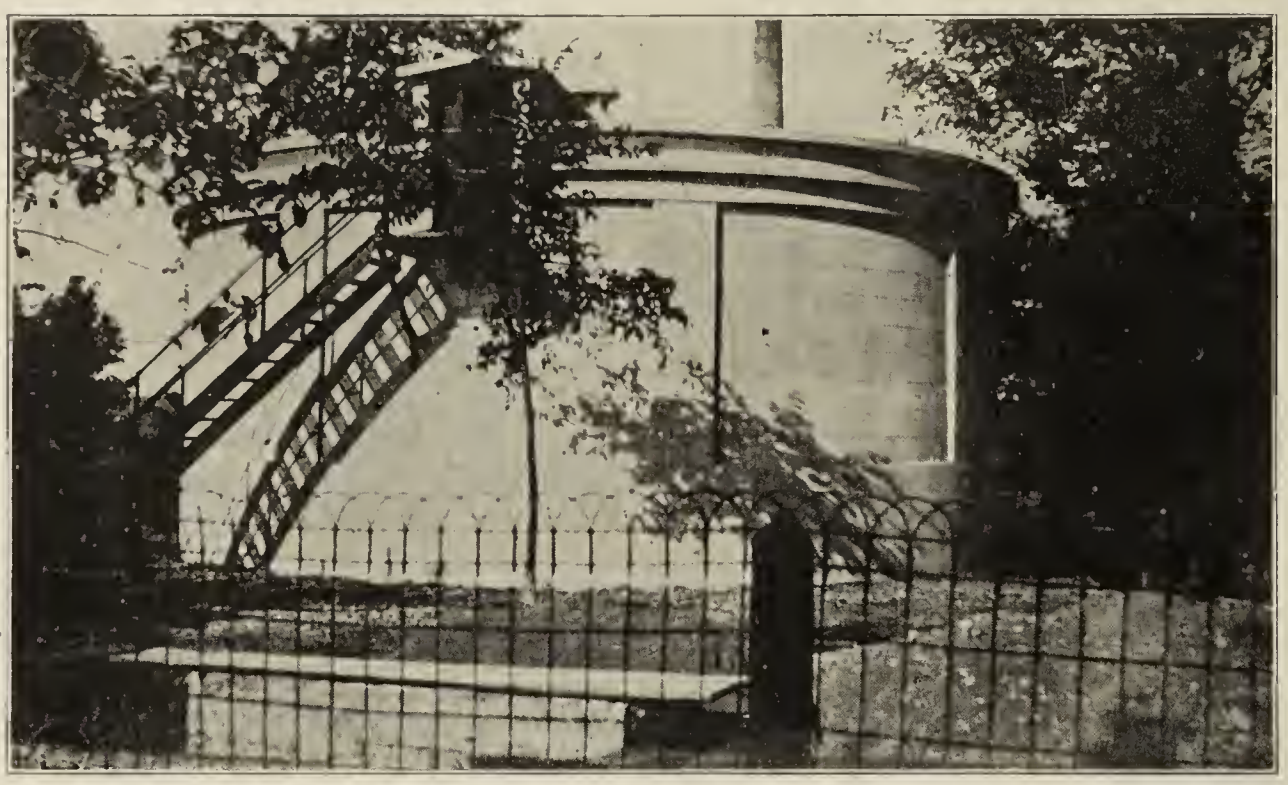
(Division-Pierce Products Co.)

WALDHEIM BLDG. KANSAS CITY, MO.

STEGER BLDG. CHICAGO, ILL.

HYDRATED LIME
FOR Superior Quality Concrete
In Roadways, Bridges, Culverts, Sidewalks, Gutters, Curbs, Retaining Walls

Recent investigations and experiments by prominent highway engineers have led them to recognize in HYDRATED LIME an effective, safe and suitable material which may be used as an admixture with concrete to obtain a degree of permanency in concrete road construction not heretofore realized.



View of the concrete reservoir erected by the City of New Ulm, Minn.

The floor, walls and roof are of a 1-2-4 mixture, with addition of 5 per cent hydrated lime. After the removal of the forms, a 1-2 mixture of cement mortar, including 10 per cent hydrated lime and 3 per cent cement waterproofing, was applied to both inside and outside walls as a finishing coat, about ½ inch thick.

Hydrated Lime in Concrete Roads

It Facilitates the Handling and Placing of the Concrete and Is Productive of the Following Results:

1—Increases the plasticity and homogeneity of the mass, causing the concrete to flow more readily into place, and increasing the covering capacity and spreading qualities of the cement.

2—Reduces to a minimum the tendency towards segregation.

3—Causes the retention of a sufficient amount of moisture in the concrete while setting to aid further hydration of the cement and to reduce the risk of shrinkage cracking.

4—Being a void preventative, it renders the slab less porous and more impermeable, largely reducing the alternate absorption and expulsion of moisture, thereby minimizing expansion, contraction, internal stresses, and cracking, which arise mostly from changes in moisture content.

5—Produces density and uniformity in the finished concrete, thereby adding to the life and efficiency of the road by elimination of stone pockets and other sources of irregularity in strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

Marblehead Lime Co., Chicago—Kansas City

Ste. Genevieve Lime Co., St. Louis, Mo.

National Lime & Stone Co., Carey, Ohio

Merion Lime & Stone Co., Norristown, Pa.

Lee Lime Co., Lee, Mass.

Rockland&RockportLimeCorp. New York—Rockland, Maine—Boston

Ohio Hydrate & Supply Co., Woodville, Ohio

American Lime & Stone Co., Tyrone, Pa.

White Marble Lime Co., Manistique, Mich.

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

John D. Owens & Son Co., Owens, Ohio.

Vermarco Lime Co., West Rutland, Vt.

Glencoe Lime & Cement Co., St. Louis, Mo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

Woodville Lime Products Co., Toledo, Ohio

Western Lime & Cement Co., Milwaukee, Wis.

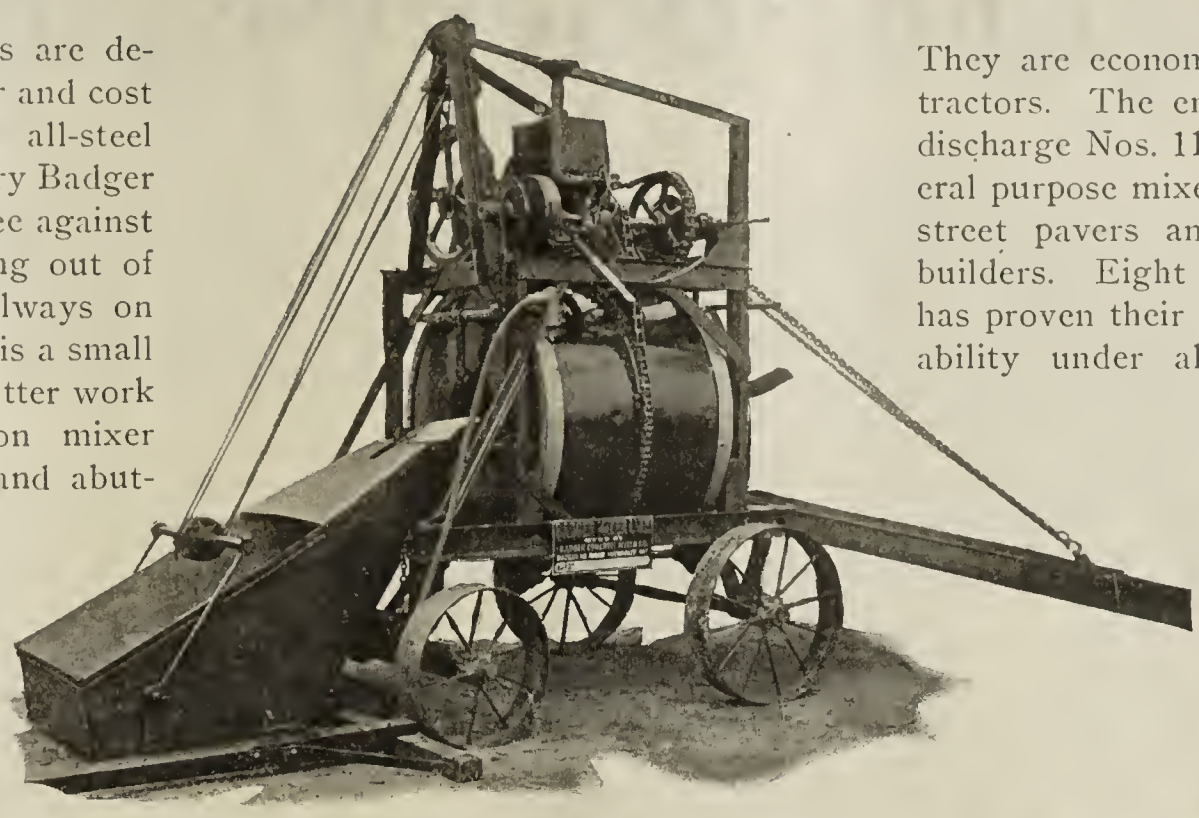
Hunkins-Willis Lime & Cement Co., St. Louis, Mo.

Riverton Lime Co., Riverton, Va.

Union Lime Co., Milwaukee, Wis.

BADGER MIXERS

The Badger Mixers are designed to save labor and cost of operation. The all-steel construction of every Badger Mixer is a guarantee against breakage or wearing out of parts. They are always on the job, whether it is a small mixer on curb or gutter work or the construction mixer upon foundations and abutments or the alley and street paver. Their light weight and durability has made a distinctive reputation for the Badger Mixer.

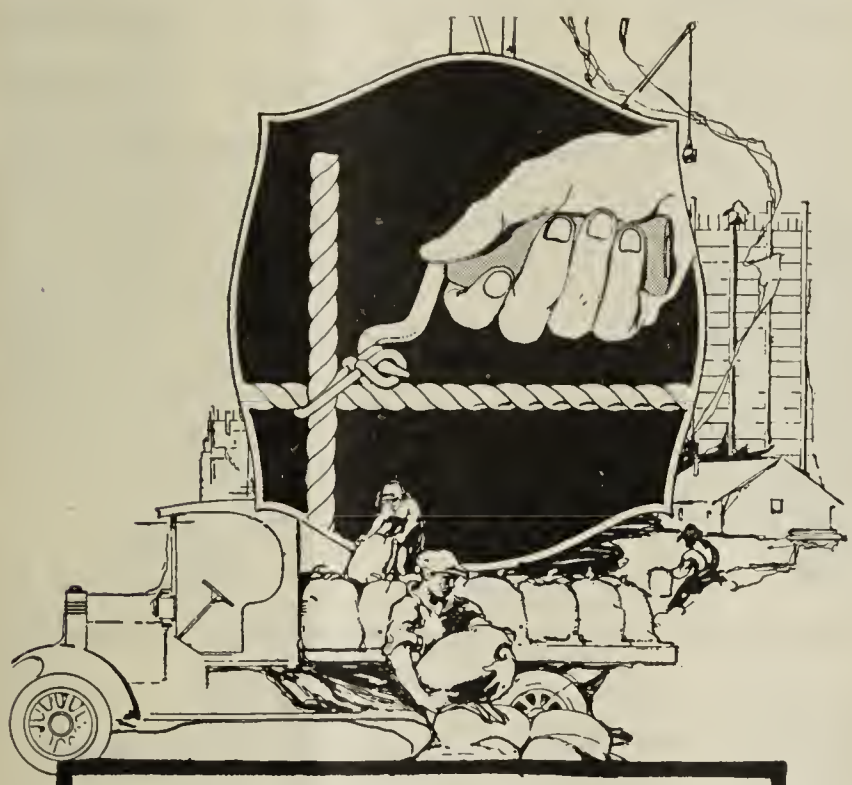


They are economical to the contractors. The end load and end discharge Nos. 11 and 15 are general purpose mixers and alley and street pavers and country road builders. Eight years of service has proven their absolute dependability under all conditions of concrete work.

Write for our attractive prices.

The ~ Badger ~ Mixer Line

BADGER CONCRETE MIXER CO., 13th Floor MAJESTIC BLDG. **MILWAUKEE, WIS.**



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You don't make your deliveries with ox-teams —you use powerful, modern motor trucks. Discard your pliers, use Bates Wire Ties and Tyers on reinforcing rods. For ease, speed and economy the Bates Wire Tying System can't be beat.

Sample Tying Outfit The Bates Sample Tying Outfit acquaints you with the value of the Bates System for your work. Write for details concerning this sample outfit offer.

BATES VALVE BAG COMPANY

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BATES SYSTEM FOR FILLING & CLOSING BAGS

LARGEST DEALERS IN USED AND NEW

TANKS

Send for our new tank list—most complete ever issued

THE CURTISS-WILLIS CO.

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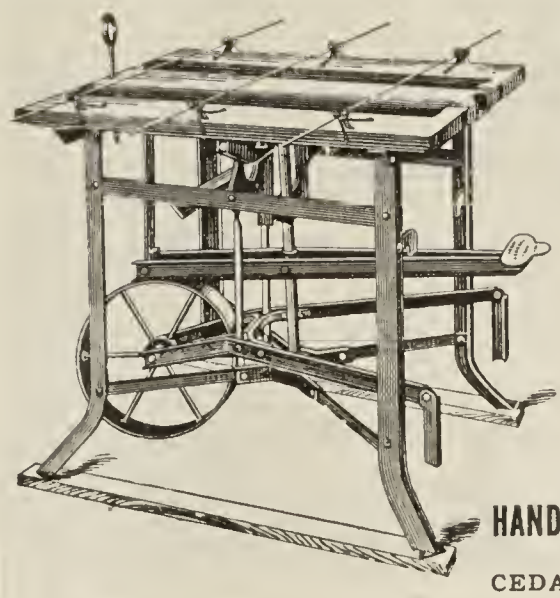
BECAUSE WE SPECIALIZE ON

Lock Seam Pipe with the smooth inside surface, having already furnished large quantities for Potash Recovery plants, we are able to give especially careful attention to the construction of this class of Pipe.

Robertson Bros. Mfg. Co., Chicago



SAVE CEMENT SACK LOSS

Bale your sacks up tight and right. Keep them baled up all the time. If you have one of our handy sack balers you will do this. We manufacture a cleaner that cleans. Write us for prices and further information.

HANDY SACK BALER CO.

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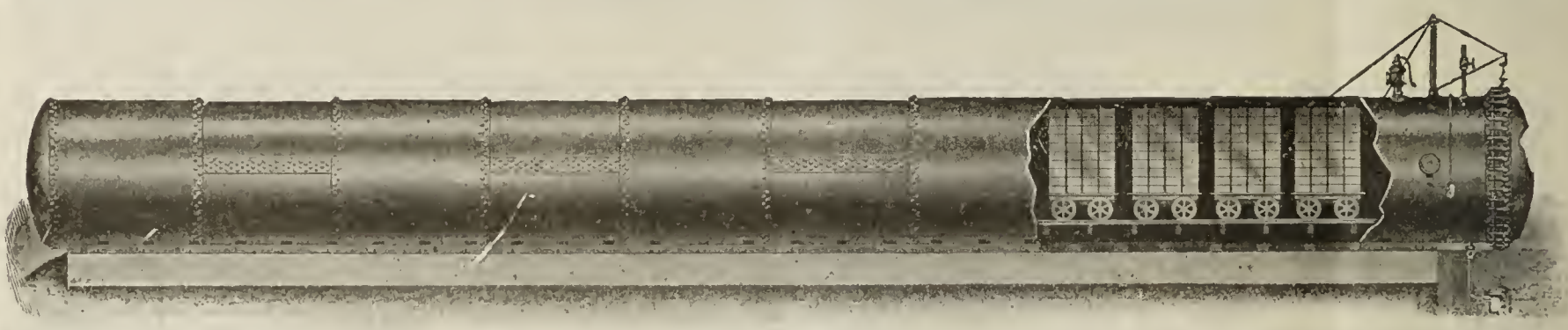
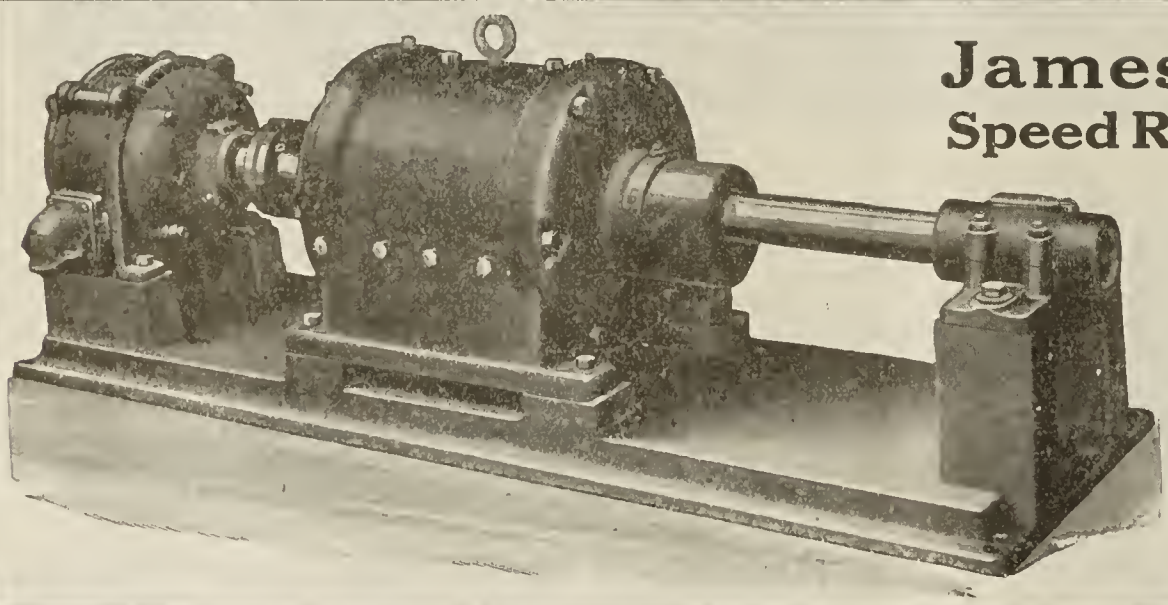
Sand Lime Brick Machinery

Our complete line of Sand Lime Brick Machinery makes it possible to secure just that machinery which is required to make your plant a success. We favor no particular type of machinery but are guided by the needs of the customer. Our wet and dry grinding mills have transformed a number of unsuccessful plants into dividend producers, while our Presses, Mixers, Hardening Cylinders and other equipment are of equal quality. We can exactly meet the demands of any manufacturer with a quality of machinery which will operate at a profit with a minimum amount of attention and expense.

Correspondence solicited

The Hadfield-Penfield Steel Co.,
WILLOUGHBY, OHIO
Formerly The American Clay Machinery Co.





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Entire gearing encased. No dirt or dust can reach the working parts, and runs in oil. Built in a variety of sizes and speed ratios from 4:1 to 1600:1 or more—½ H.P. to 100 H.P.
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All-Steel Machines for All Kinds of

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High Grade Goods Only

Satisfaction Guaranteed

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Vertical Cement Mill Motors

will keep your vertical pulverizers in steady operation, because

—Their shafts are of the best steel and of large proportions to avoid distortion due to severe belt stresses.

—Their liberal bearings at the top and bottom are oiled independently by a centrifugal oiling system which has stood the test of time. There is no middle bearing to cause trouble.

—Their windings are braced to withstand vibrations and are specially insulated.

—The construction of the motor throughout is such that it will withstand severe usage and a dusty atmosphere.

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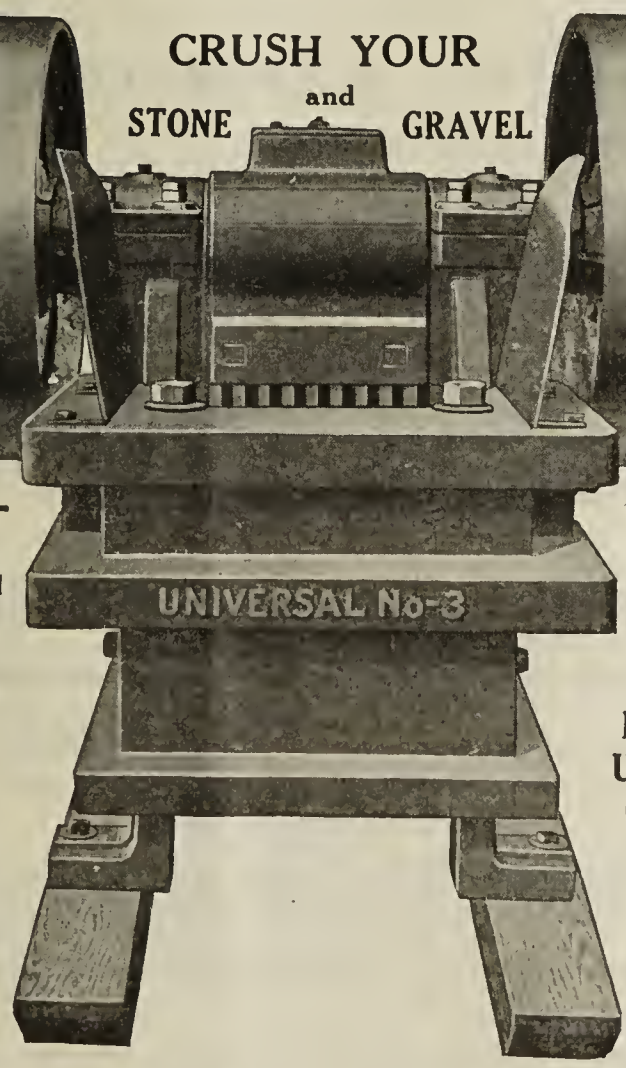
East Pittsburgh, Pa.

Two 250 hp. Westinghouse Vertical Cement Mill Motors driving Bradley Pulverizers of the Lowerence Portland Cement Co.

CRUSH YOUR STONE and GRAVEL



The Ideal Crusher for the Concrete Product Plants, Gravel and Crushed Stone Producer

The World's Famous Universal Crusher

We Build Crushers from 5 Tons to 300 Tons per 10-hour Capacity

Instantly adjusted to produce size required from ¼ inch to 3 inches. *Write for Folder No.* 14.

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Save more than they cost!

In these days it isn't entirely a question of how much it will cost to replace worn-out equipment. It's more a question of whether or not you can get new equipment at all. It's therefore doubly essential that you take proper care of those machines you are now fortunate enough to have.

Plain and waterproof covers for all purposes. New and second-hand tents for sale or rent.

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Many buyers now take advantage of facilities at mill by ordering bars cut to length, bent to shape, and tagged—ready for placing.

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STEEL BARS
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We can meet your Reinforcing Steel Requirements. This means not only quick shipment from the mills but co-operative service for rapid transportation. If you want to know just what your exact cost will be, send us the Blue Prints and we will give you a lump sum bid on all the steel sheared to lengths, bent to specifications and delivered to the job,

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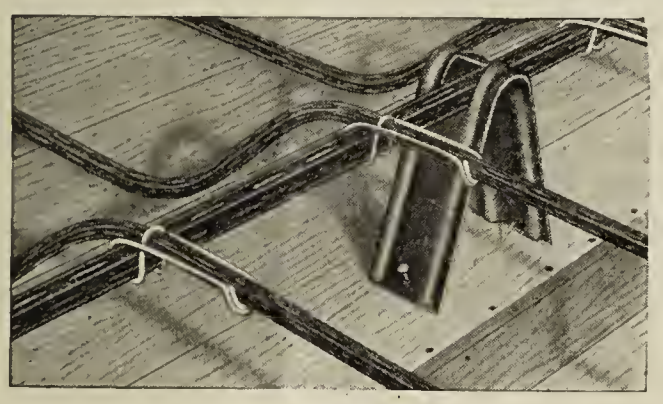
The secret of added strength in concrete structures is obtained by using HAVEMEYER BARS and this added strength is insured by properly placing and securing the reinforcement with



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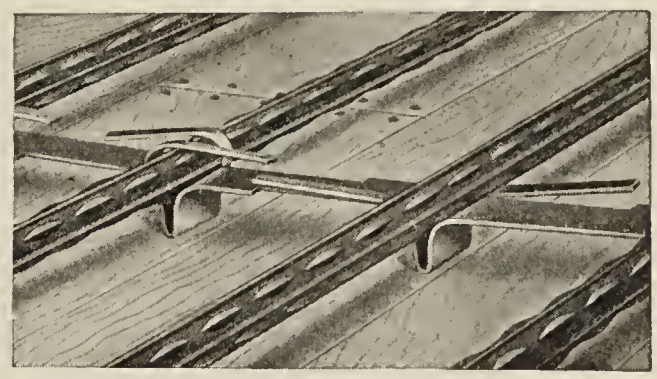
For supporting head rods over column heads and for over direct bands in flat slab and bent bars over beams in beam and girder construction.

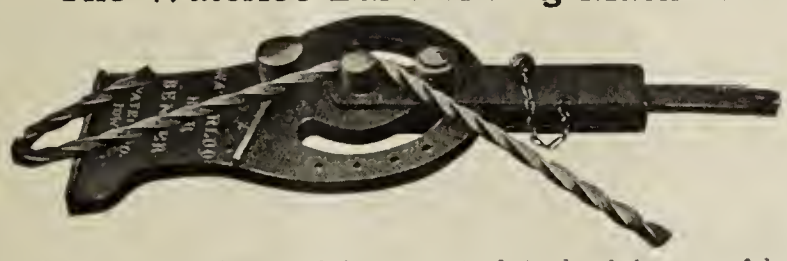
HAVEMEYER PRODUCTS

Concrete Steel Co.
Monadnock Block
CHICAGO



SLAB BAR-SPACER
For supporting and spacing bars in the slab.

Contractors can't afford to be without
The Waterloo Bar Bending Machine



It's made in 2 sizes, and is guaranteed to bend bars as follows: No. 2 bends cold reinforcing bars including 1⅛ in. round or square. Price $30.00. No. 3 bends cold reinforcing bars including 1¼-in. round or square. Price $35.00.

Bends bars to various angles desired. Has a detachable handle 7 feet long for convenience in handling.

Waterloo Construction Co., Waterloo, Iowa

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SWITCHES
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Portable and Industrial Track, Tie Plates, Switch Stands, Rail Braces, etc. Can make prompt shipments.

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SECOND-HAND MACHINERY AND EQUIPMENT

SPECIAL ATTENTION

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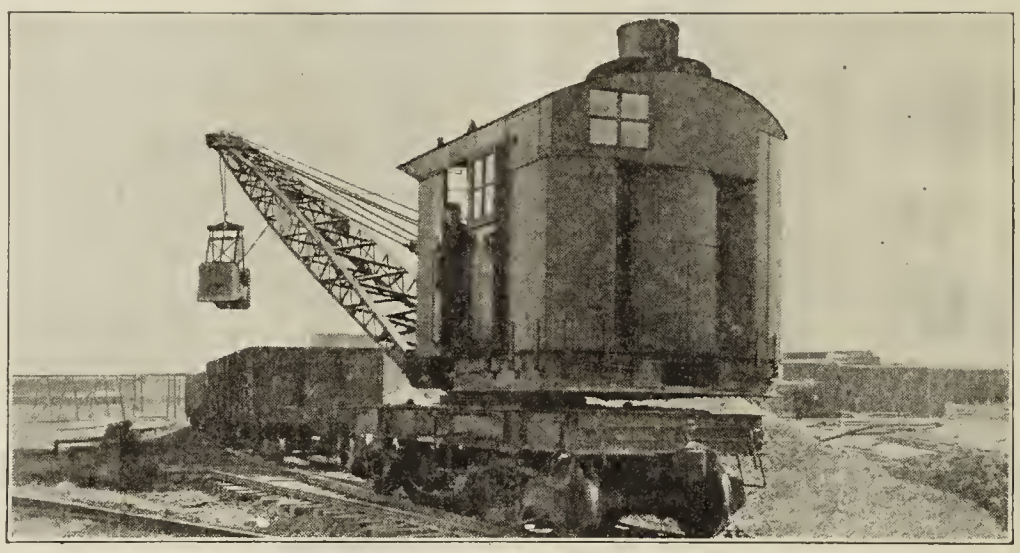

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We Own Outright and Offer for Prompt Deliveries the Following Equipment for Lease or Sale—Subject to Prior Disposition

1—30-ton **Industrial Works Locomotive Crane,** 50 ft. and 90 ft. Sectional Radius Boom, 8-Wheel Railroad Trucks, etc. This is a strictly modern practically new Locomotive Crane, little used in actual service.

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2—20-ton **New Brown Hoist Locomotive Cranes,** 50 ft. Radius Boom, 8-Wheel Railroad Trucks, etc. These Locomotive Cranes are new machines. (These are very popular Locomotive Cranes.)

1—20-ton **McMyler Interstate Locomotive Crane,** 50 ft. Radius Boom, 8-Wheel Railroad Trucks, etc. This Locomotive Crane is just like new.

1—15-ton **Brown Hoist Locomotive Crane,** 50 ft. Radius Boom, 4-Wheel Trucks, etc. **Strictly Modern Crane,** very little used.

1—10-ton **McMyler Interstate Locomotive Crane,** 35 ft. Radius Boom, 4-Wheel Trucks, etc. **Very Fine Crane.**

Several **Clam Shell Buckets,** various sizes from ½ to 1½ yard capacity. **Blaw Knox, Brown Hoist, Owens, Browning, Hayward** and **McMyler** manufacture. Some of these Clam Shell Buckets have been used in actual service less than thirty days. These Clam Shell Buckets are just like new.

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1—**All Steel Stiff Leg Derrick,** 40 ft. Radius Boom, etc. **Just Like New. Practically Immediate Shipment.**

2—No. 0 **Thew Revolving Traction Steam Shovels** mounted on Wide Tire Traction Wheels, ¾-yard Dippers. **Especially Desirable Purchases.**

1—Model 60 **Marion Steam Shovel,** 2½-yard Dipper, etc. **Splendid Machine.**

1—17x24-45-50-ton, 6-Wheel Connected, Standard Gauge **Baldwin Switching Locomotive** with Separate Tender, coming right out of our shops. Strictly A-1 condition, just like new.

Several 36-in. Gauge, also 24-in. Gauge Saddle Tank Locomotives for **Prompt Shipment.**

2—Standard Gauge **Combination Passenger and Baggage Coaches. Prompt** shipments, right out of our Chicago shops.

All quotations subject PRIOR SALES. Please act quickly.

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RAILROAD AND CONSTRUCTION CARS, ALL TYPES

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What are your Requirements? — Please Telegraph, Telephone or Write us

A. C. TORBERT

Continental and Commercial Bank Bldg., Chicago

Shops and Storage Yards at Chicago

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We Specialize in Leasing Equipment

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WARNING—RAIL USERS!

If you are needing more track BUY NOW. There is a SCARCITY.

We own and offer the following NEW RAILS for prompt shipment:

12-lb. rails, angle bars, bolts and nuts.
90-lb. rails, angle bars, bolts, nuts and spikes.

They will be gone soon. Write or wire for our quotations. Also No. 1 70-lb. A. SCE Relayers with Webber Joint.

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Concrete Mixers: Two Ransome ¾-yd., mounted for standard track; water-measuring tank; G. E. motor, 15 H. P., 220-volt, A. C., 60-cycle, 3-phase.
Concrete Carts: Twenty-four Ransome 2-wheel Carts, 6'; wheels 42" diam.
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Hopper Gates: Ransome 12" Gates; hand operated.
Pumps: Worthington Duplex Pump; size 10x6x12.
Flat Cars: Southern Iron & Equipment Co.; standard gauge; steel frame; air brakes; capacities, one 80,000 lbs., two 60,000 lbs., six 50,000 lbs.
Locomotive: Vulcan, 40-ton; standard gauge; 4 drive wheels; coal box combined; saddleback water tank.
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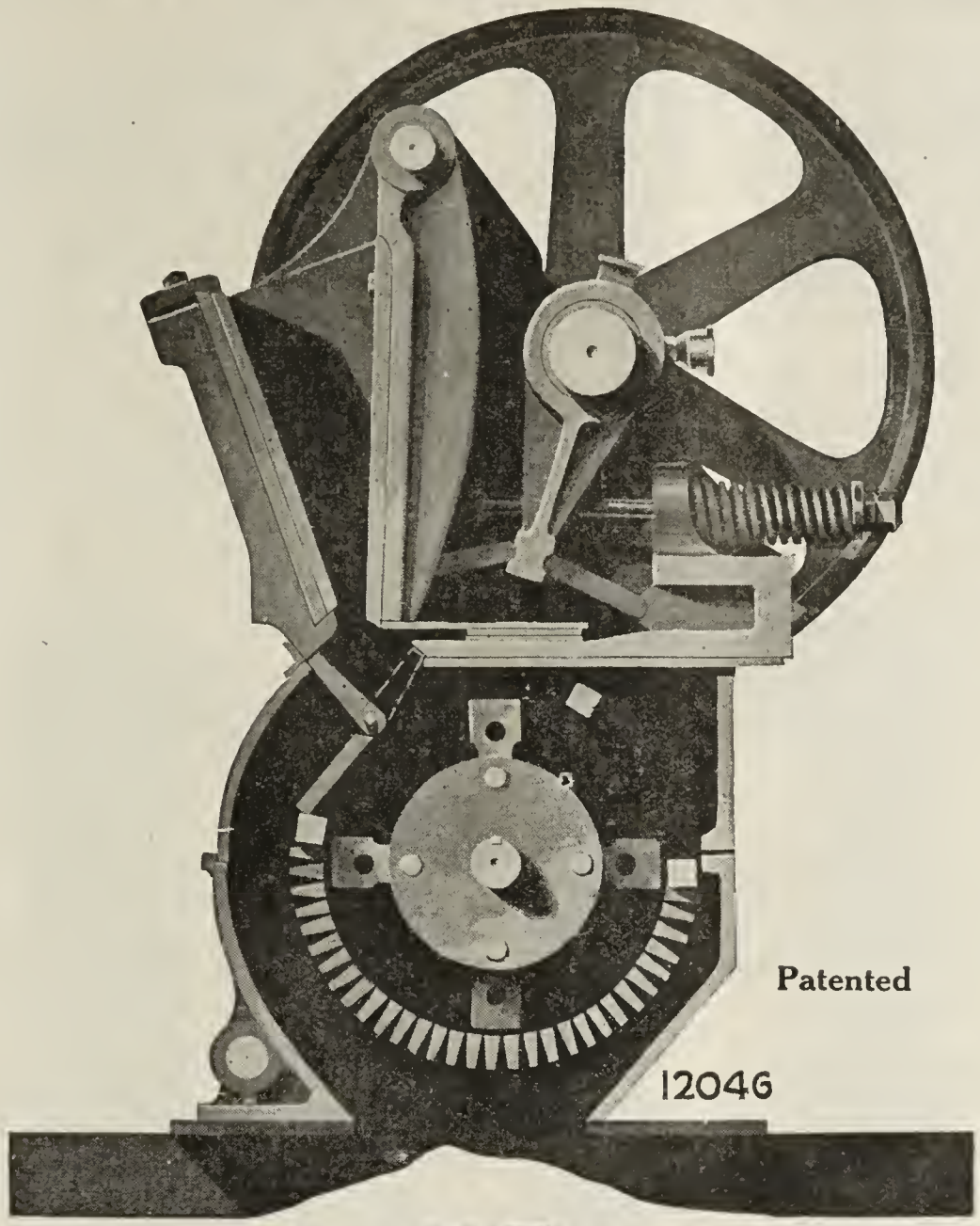

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CEMENT AND ENGINEERING NEWS

with which Gravel & Stone Magazine is Incorporated

22 Quincy Street, Chicago.

(PUBLISHED MONTHLY)

William Seafert, *Publisher and Editor*

J. F. Waldron, *Advertising Manager*

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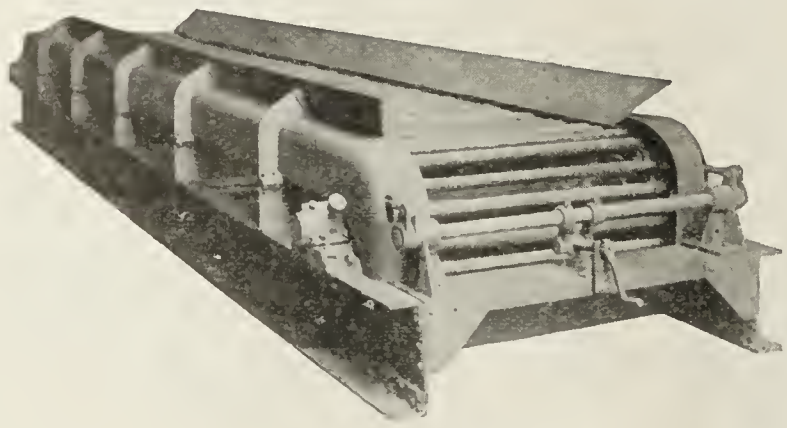

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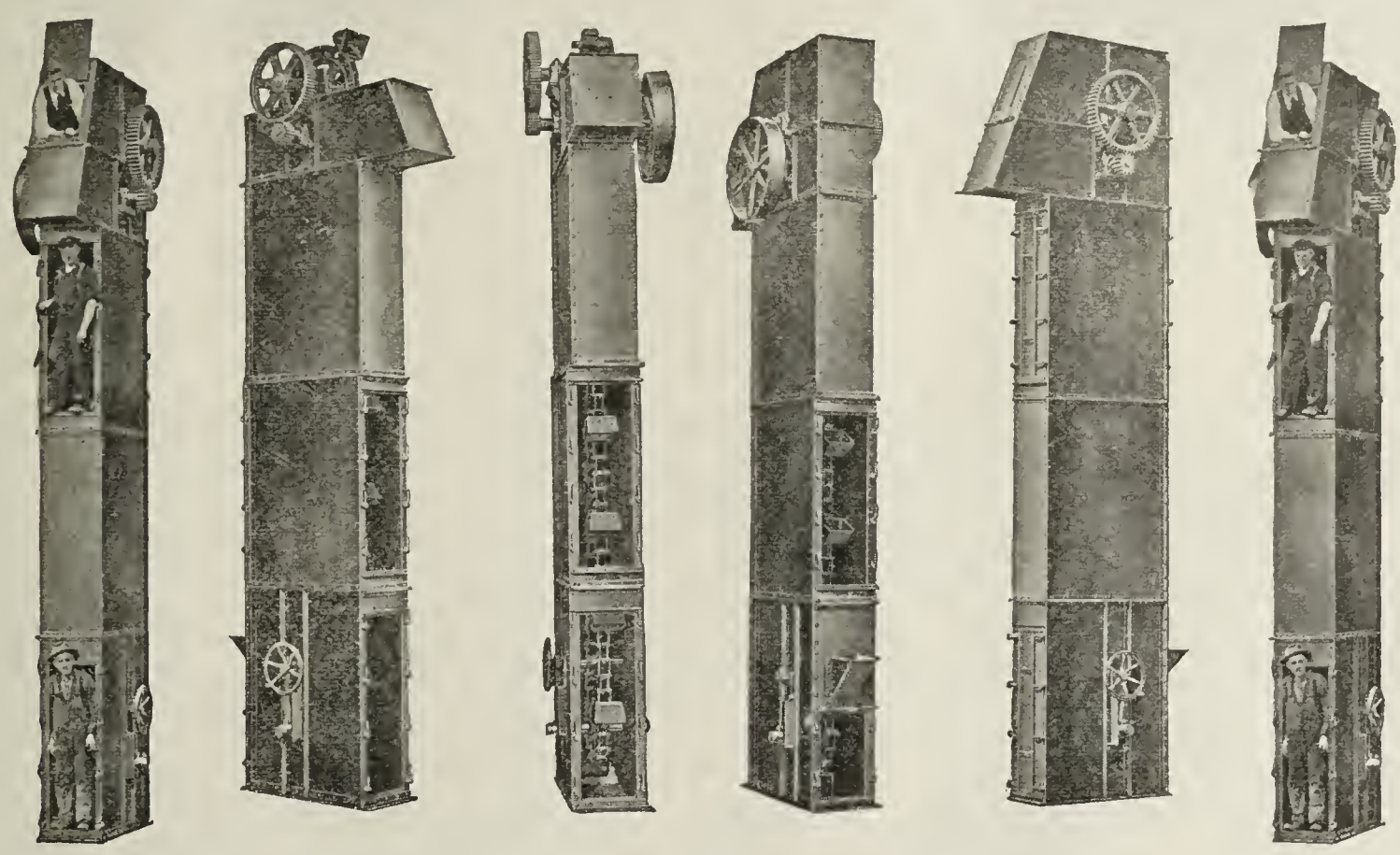

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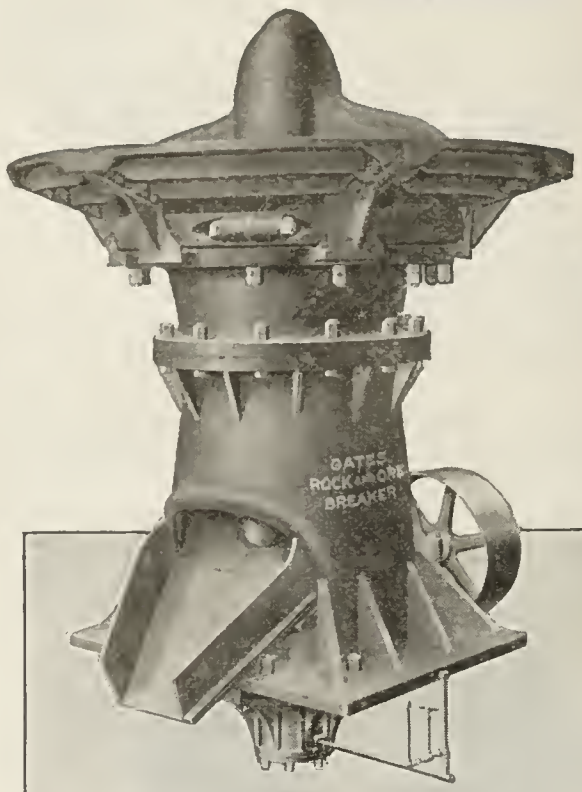

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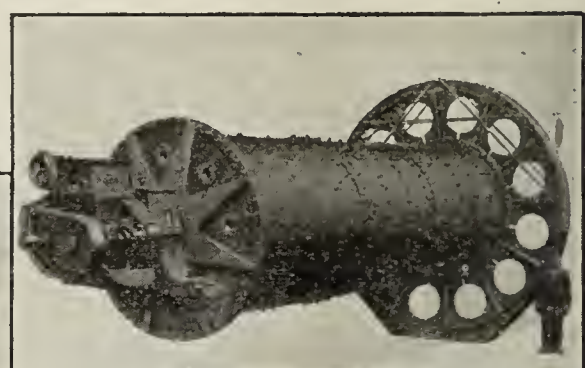

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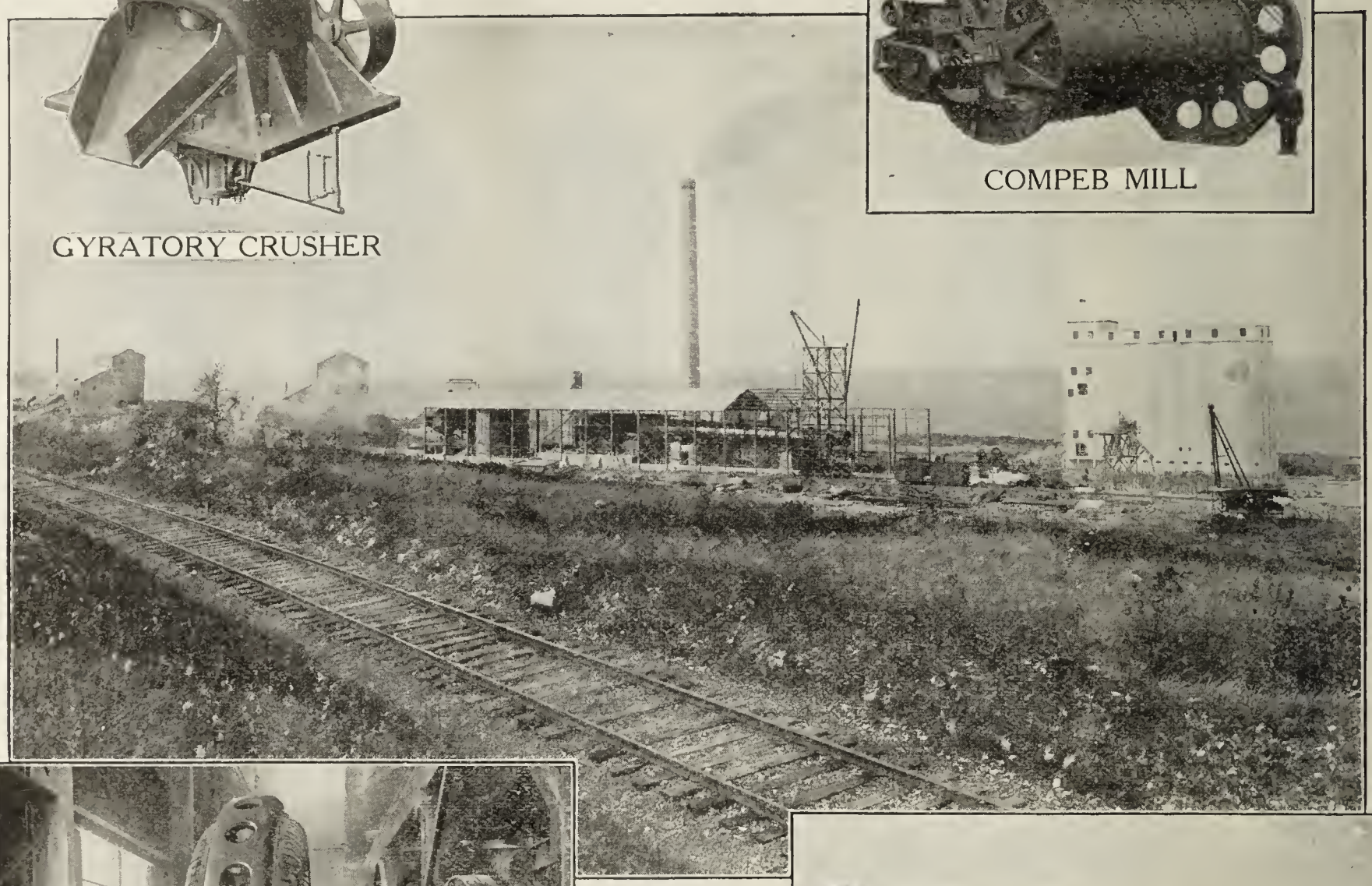

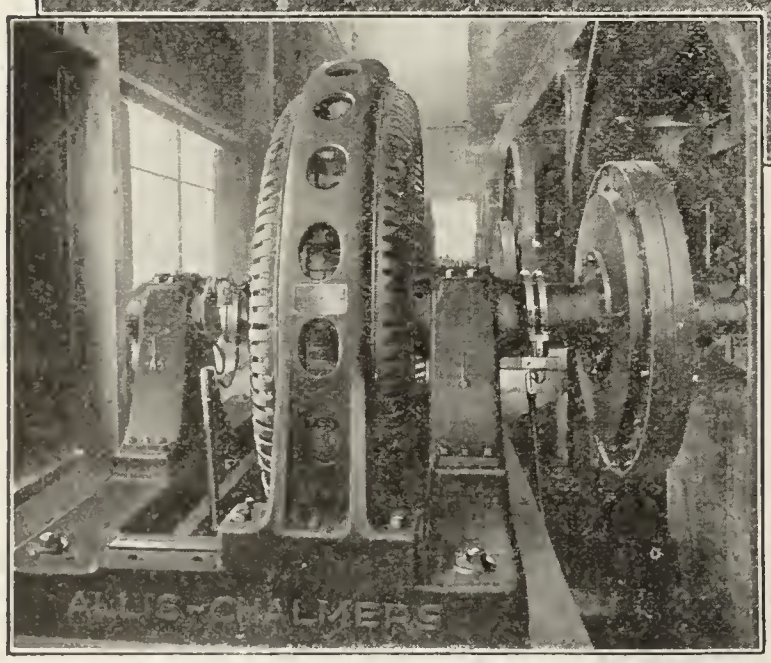

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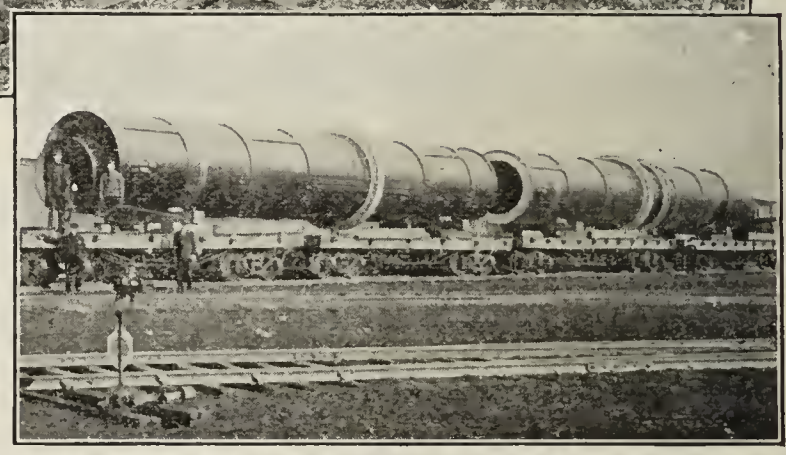

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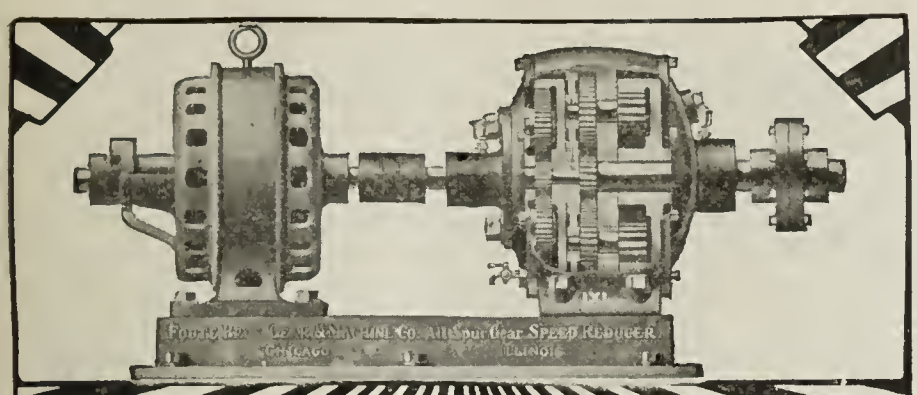

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BALLS

Forged steel balls of special analysis steel from 2″ to 15″ in dia. carried in stock. Can't be excelled.

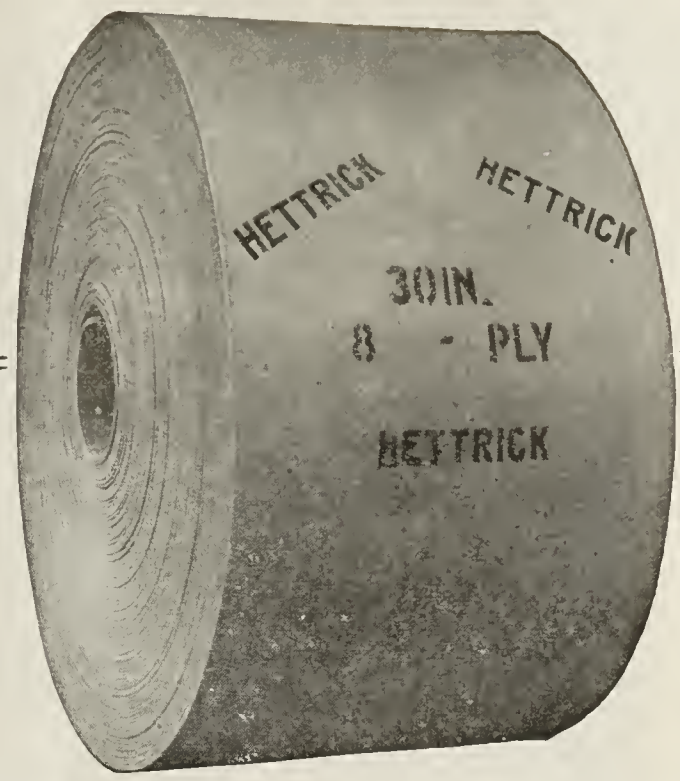
BALL MILL PLATES
CRUSHER SHAFTS
GRIFFIN MILL SHAFTS
GRIFFIN MILL CONVEX SEATS
GRIFFIN MILL CROSSHEADS
PIPE FLANGES
For High Pressure Work
STEAM SHOVEL, TRUCK AND CAR AXLES

Hammer and Hydraulic Press Forgings of all Kinds

We make quick service a feature of our business

TIOGA STEEL & IRON CO.

52nd AND GRAY'S AVENUE, PHILADELPHIA, PA.



ENDURANCE is built into every inch of HETTRICK stitched Canvas Belting

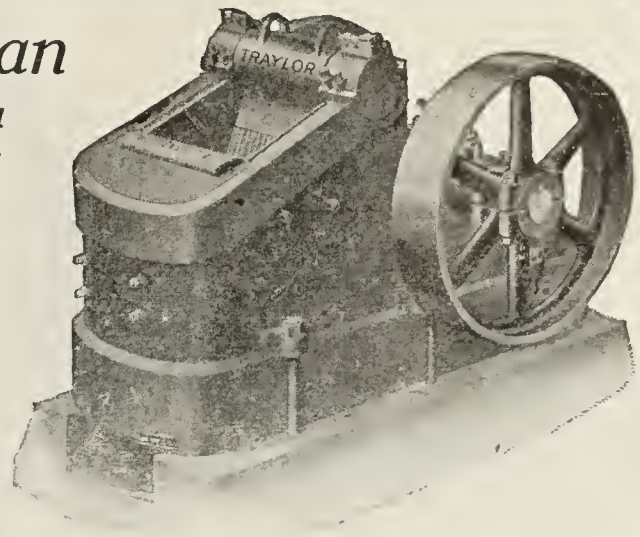
It takes the burden of tremendous stress and strain without weakening. Hettrick canvas belting has great resistance to wear, has little stretch, and grips positively. Neither water, oil or steam can impair Hettrick efficiency.

Write for circular and prices.

THE HETTRICK MFG. CO.

TOLEDO, O.

Traylor "Bulldog" Jaw Crushers Mean a Saving at Any Crushed Stone Plant



One method of designing crushers is to make them so massive throughout that it is practically impossible for them to be subjected to strain. Yes, they crush but the cost of operation is terrific.

Traylor Engineers strove to design the lightest yet the strongest crusher possible, that's why the frame of every "Bulldog" Jaw Crusher has a steel band shrunk on it top and bottom and all are equipped with the "Bulldog" Toggle system, the pitman of which is by far the lightest yet strongest of its kind being; made of wrought-steel tension members.

And it's this fine balance of weight and strength that makes the "Bulldog" crusher so economical to the user. Ask your neighbors about the power costs of their "Bulldog" Crushers.

TRAYLOR ENGINEERING & MFG. COMPANY, Allentown, Pa.

New York *Chicago* *Pittsburgh* *Los Angeles* *Spokane*

Truck and Tractor Division, Cornwells, Bucks Co,, Pa.

For Immediate Delivery

10 in. x 20 in. Type "A" Jaw Crusher
14 in. "Bulldog" Gyratory Crusher
No. 7½ Gyratory Crusher
36 in. x 16 in. Type "A" Crushing Roll

And the Same Economy That's Found in Traylor "Bulldog" Crushers is Built in Traylor Motor Trucks and All Purpose Tractors

AJAX CONVEYOR BELTING

IN the Ajax Brand Rubber Conveyor Belting we offer a first class belt for ordinary conveying purposes. The duck and rubber is of good quality and will compare favorably with the good belts now on the market. We make it with a flat or convex surface, and with a cover varying in thickness from one-sixteenth inch to one-fourth inch. For conveying coal, sand, gravel, stone, etc.

Advise us regarding your installations. We make belts for every purpose.

Conveyor Belts *Transmission Belts* *Packing*
Elevator Belts *Hose—all Kinds* *Valves, etc.*

The Gutta Percha & Rubber Mfg. Co.
301 West Randolph Street
Chicago, Ills.

New York Boston Seattle
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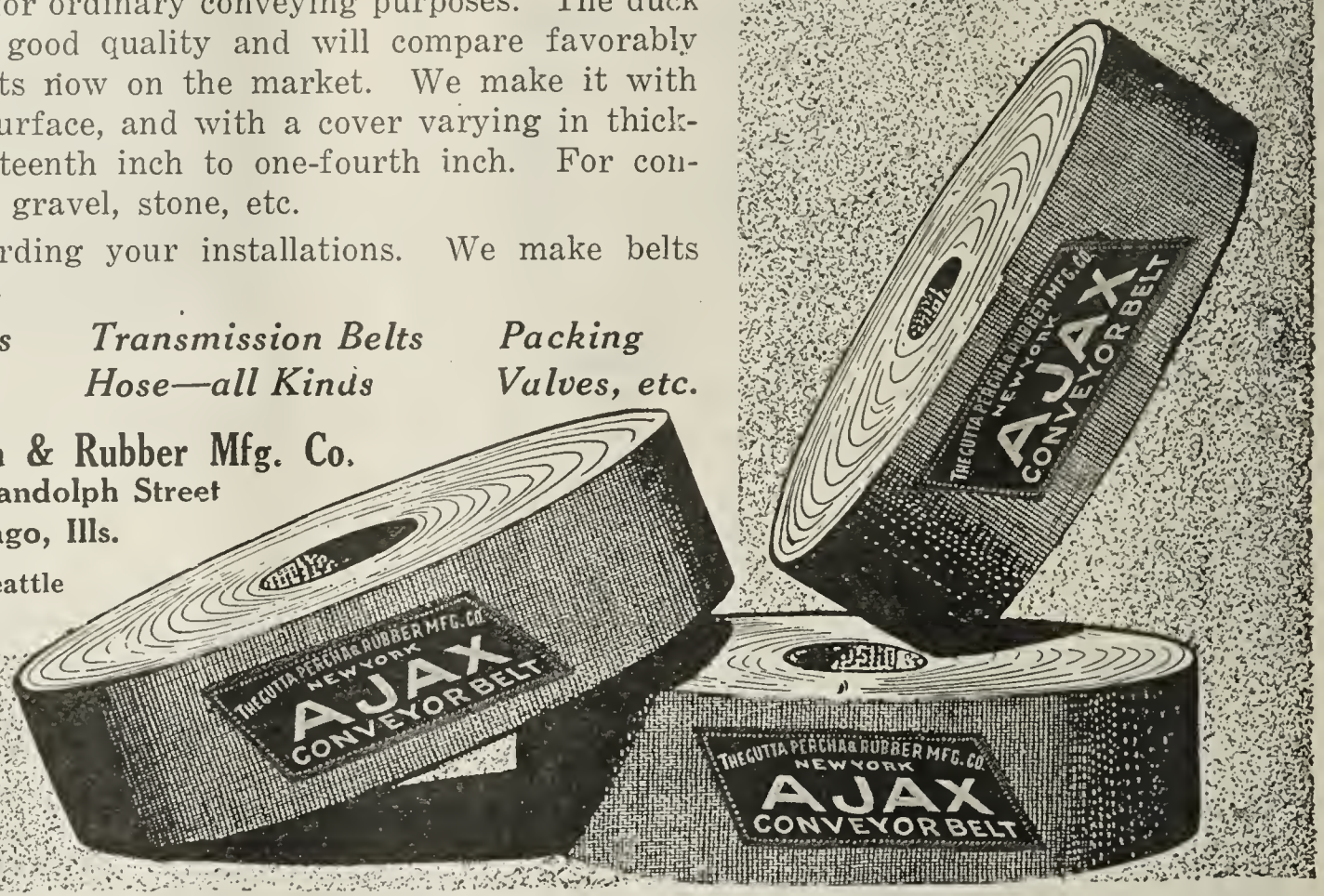

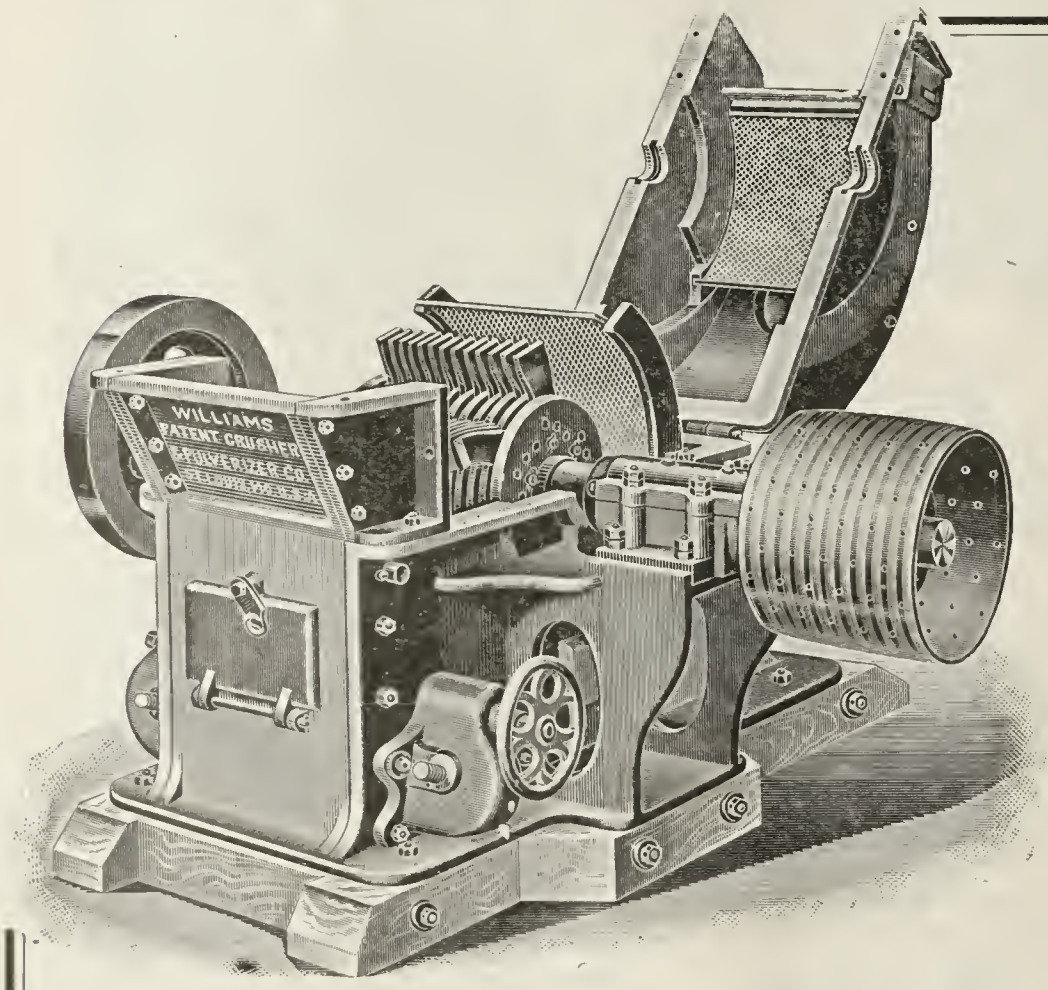

WILLIAMS
LIMESTONE GRINDERS

Take 2 in. to 3 in. dry stone and in one operation, without outside screens or separators will produce 95% through 20-mesh material.

CAPACITIES RANGE FROM ¼ TO 30 TONS PER HOUR

Over 5,000 Williams Mills in Daily Operation.

There is undoubtedly room in your plant for one of these machines, which, in the last twenty-two years have proven that they are money savers, can be depended on, and really have merit. If further information is desired, Write for Bulletin No. 17, which is brim full.

THE WILLIAMS PATENT CRUSHER & PULVERIZER COMPANY

General Sales Dept.—37 West Van Buren Street
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Plant
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SAN FRANCISCO

They Carry On and On Year In and Year Out

HARD work over a long period of years proves Diamond Conveyor Belt the belt of sure economy. Here is a Diamond Belt record that has significance to every plant that uses a conveyor belt:

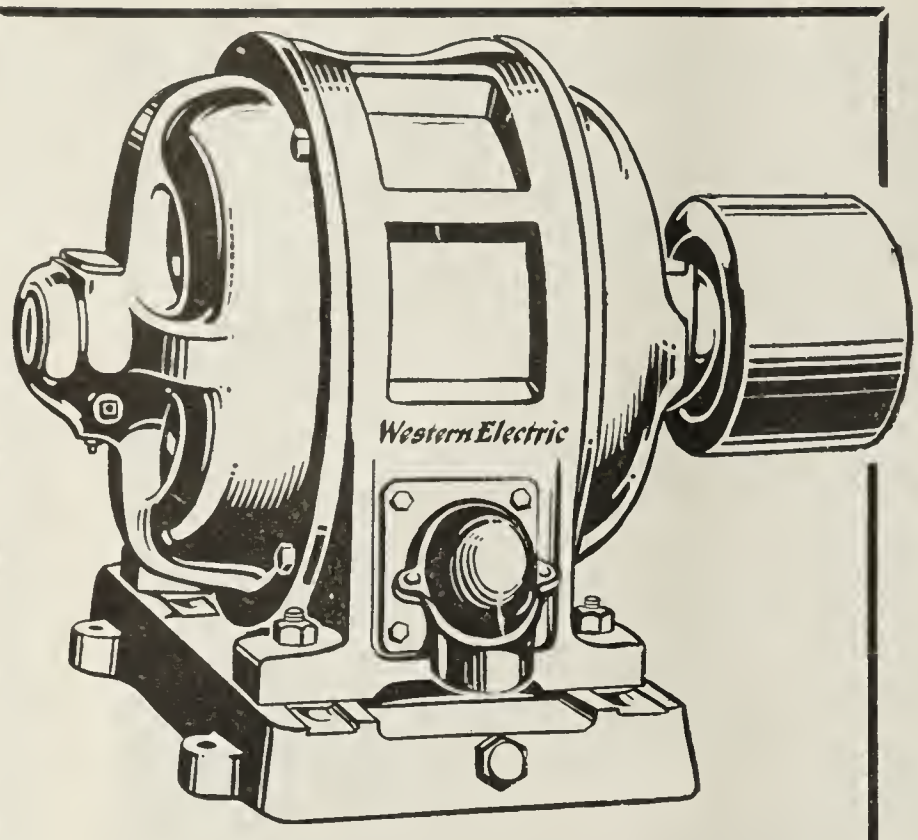
"A Diamond Conveyor Belt 30″ 6-ply, with a ⅛″ rubber cover, length 617′—running for about 100′ up an incline of 20 degrees, balance of the conveyor in horizontal position, belt speed 480′ per minute. During a period of five years and three months, this belt conveyed a total amount of 3,261,514 tons, or an average of 70.9 tons for every hour day and night, winter and summer during that entire period of time."

Diamond Conveyor Belts can do as well for you. A Diamond representative will gladly call on you, and give expert advice on your needs.

THE DIAMOND RUBBER COMPANY, INCORPORATED
Akron, Ohio

Diamond
CONVEYOR BELTS

IT'S A Diamond PRODUCT



DID YOU EVER STOP TO CONSIDER

That we have spent years of our time on your electrical problems? Years of untiring efforts which embraced university training, laboratory tests on material, plant analysis, etc? We offer you today the services of men from our organization who can carry your problems through to a successful issue, can meet your emergency just the same as we met others.

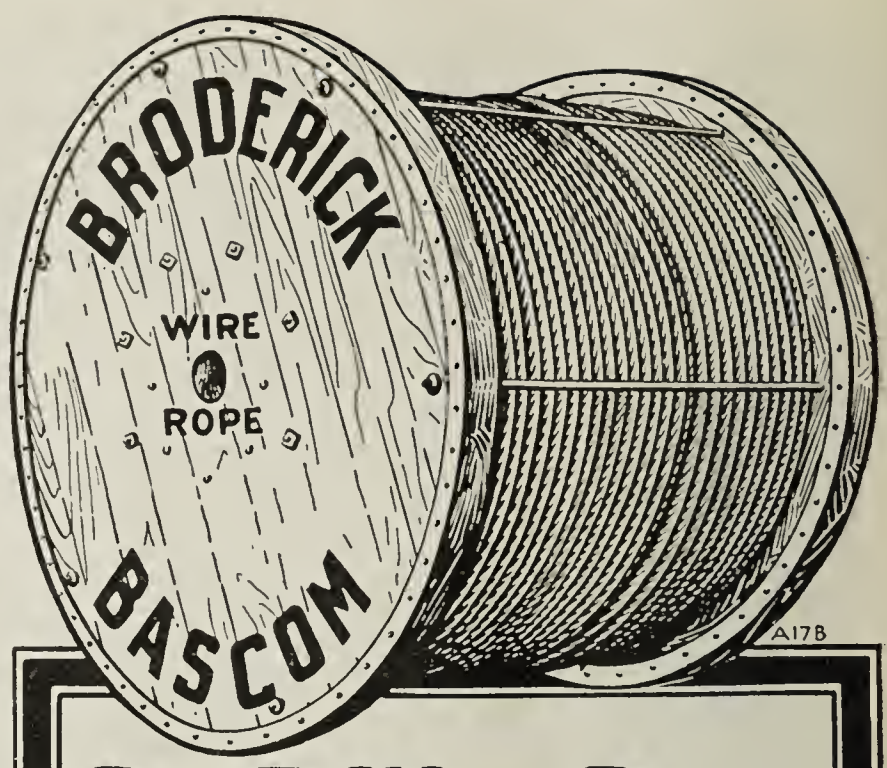
We are specialists in Motor Designing, Motor Building, Coil Building and Power Surveys. The knowledge we have gleaned after making a thorough study of cement mill plants and their operation, the experience we have gained through making the cement industry our choice of operations and our factory facilities we offer you now. We know we can be of aid to you and we also know you have your electrical problems to solve.

An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States.

Lansing Electric Engineering Co.

All the Name Implies

Lansing, Michigan



B. & B. Wire Rope

Measure B & B Wire Ropes against the requirements you demand in the best hoisting line. They're flexible, steel-strong, durable.

With those requirements successfully met, B. & B. Wire Ropes are bound to be dependable and economical. Write for Catalog 60

BRODERICK & BASCOM ROPE CO., St. Louis, Mo.

Manufacturers of Celebrated Yellow Strand and all standard grades of Wire Rope

Branches: New York and Seattle Factories: St. Louis and Seattle

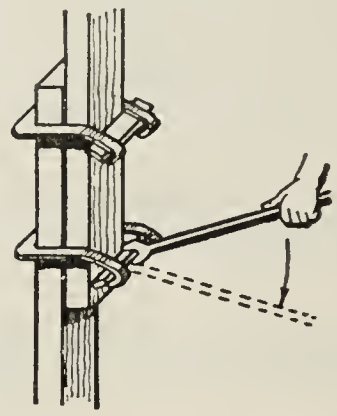
THE SCHENK "TIMBER CLAMP"

U. S. PATENT JUNE 18, 1918

IS SIMPLE

SAFE

ECONOMICAL

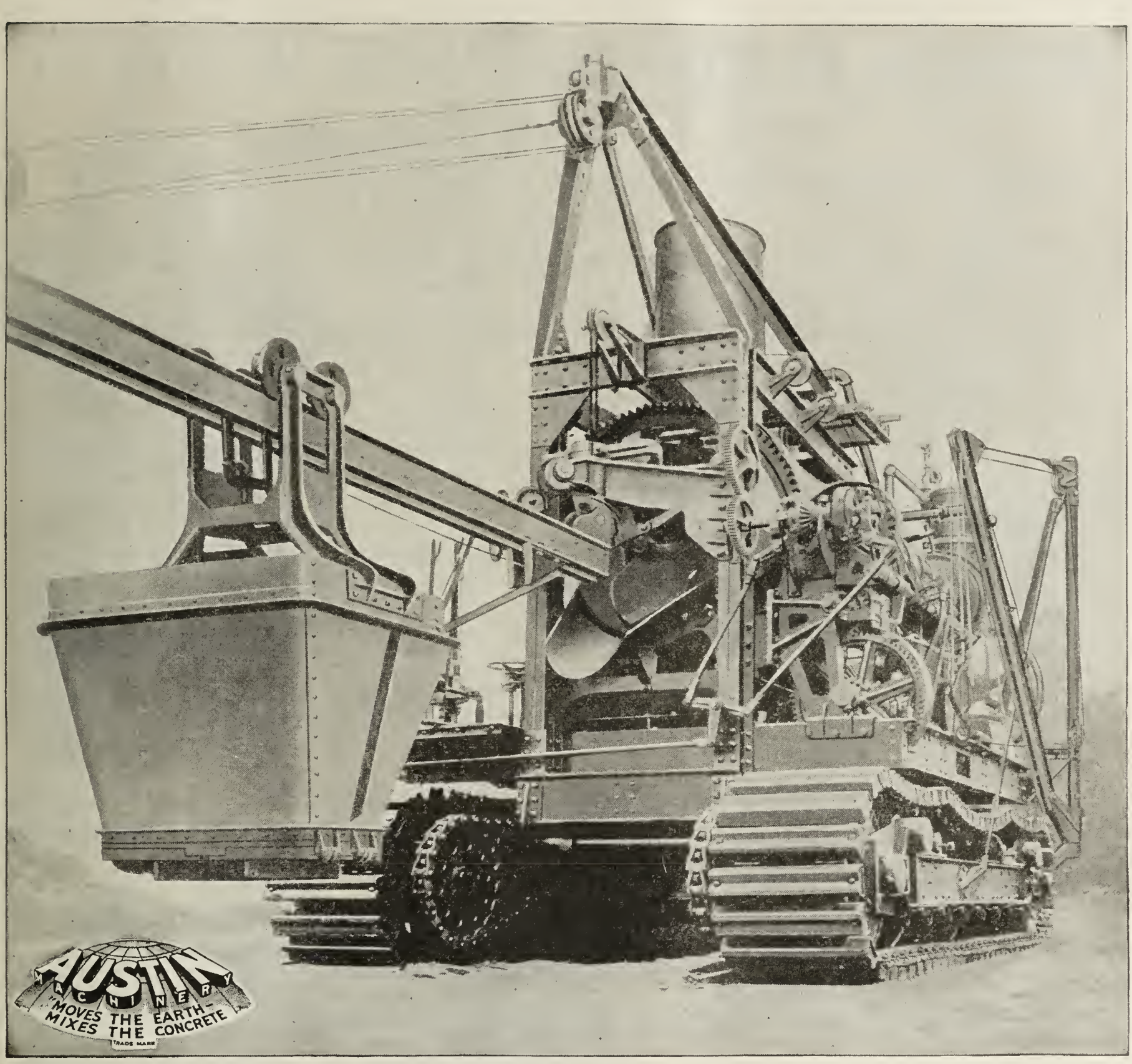


for every one who makes concrete forms, scaffolds, elevators, and every kind of temporary work where timbers should be strongly connected.

No Nails, No Sliding, No Spoiling of Lumber

Used by thousands of contractors in Europe. Ask for full particulars and free samples for trial.

Schenk's Patented Timber Clamps Co., Ltd.
2292 Larned St. E., Detroit, Mich.
TEL. EDGEWOOD 485
AGENTS WANTED THROUGHOUT THE U. S.



AND AGAIN—

WAYNE COUNTY BUYS *AUSTINS*

Beginning 1910, the first Wayne County, Michigan, concrete roads, since renowned throughout the nation, were laid with AUSTIN CUBE PAVERS.

Beginning 1921, the Board of Highway Commissioneres of Wayne County, after extensive tests and years of successful "on-the-job experience," start the season by buying two Austin 28-E Cube-Hex Pavers—the largest all-multipedal pavers ever built—mixing a cubic yard of concrete a minute.

Catalog B-21 sent on request

"A BETTER BATCH FASTER"

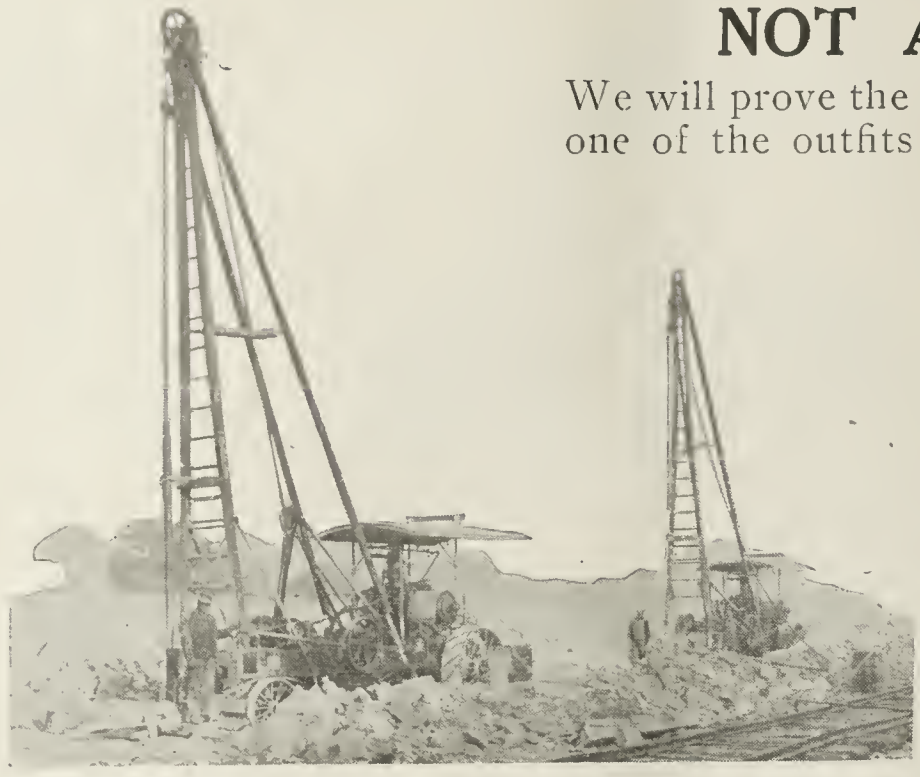
Austin Machinery Corporation

General Offices: 609 Railway Exchange Bldg., Chicago

Branch Offices: New York, Atlanta, New Orleans, Memphis, Pittsburgh, Detroit, Woodstock, Ont., Minneapolis, Omaha, Portland, Houston, San Francisco.

THE BEST BLAST-HOLE DRILL ON EARTH

THE CYCLONE No. 14



NOT A BOAST—A FACT

We will prove the superiority of the No. 14 Drill by placing one of the outfits on your work against any or all other makes.

If the Cyclone doesn't out-drill and out-wear all other drills, we will remove it from the work without cost to you.

Our proposition gets below the paint. It demonstrates what the machine will do—not what may be said about it. It puts buying on a strictly engineering basis where it belongs.

Furnished in Steam, Gasoline, Compressed Air or Electric Power, Traction or Non-Traction.

Let us send you full particulars

THE SANDERSON CYCLONE DRILL CO.

ORRVILLE, OHIO

Eastern and Export Office
30 Church St., New York

First Class Silex Slabs

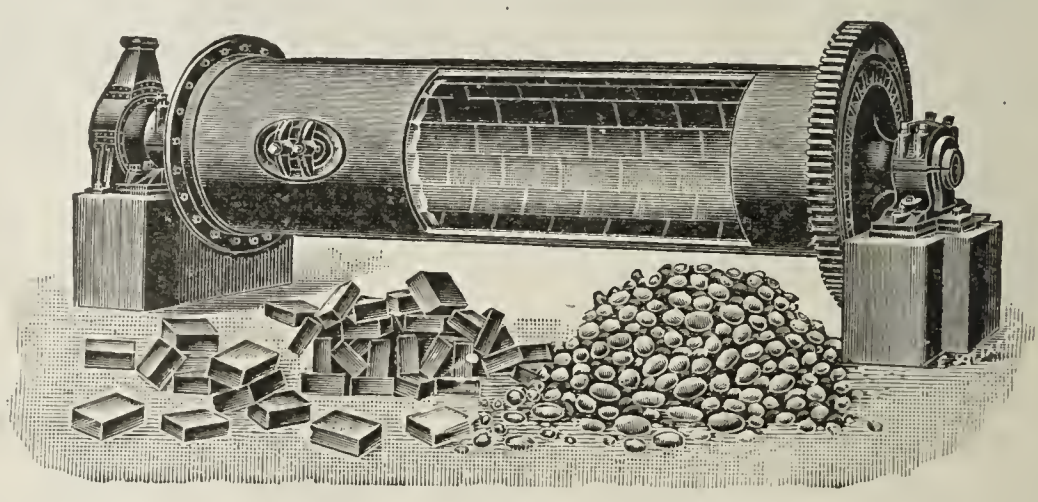
for lining of tube-mills for grinding of Cement, Clinker, Kaolin, Phosphate, Limestone, Quartz, Trap, Coal, Ores, Gypsum, Feldspar, Sand, etc.

Have successfully passed some of the most severe tests. Long life and moderate price. Immediate shipment on stock sizes. Write for prices.

Societe Generale Meuliere

La-Ferte-sous-Jouarre (S-&-M)

(France)



Ruggles-Coles Dryers

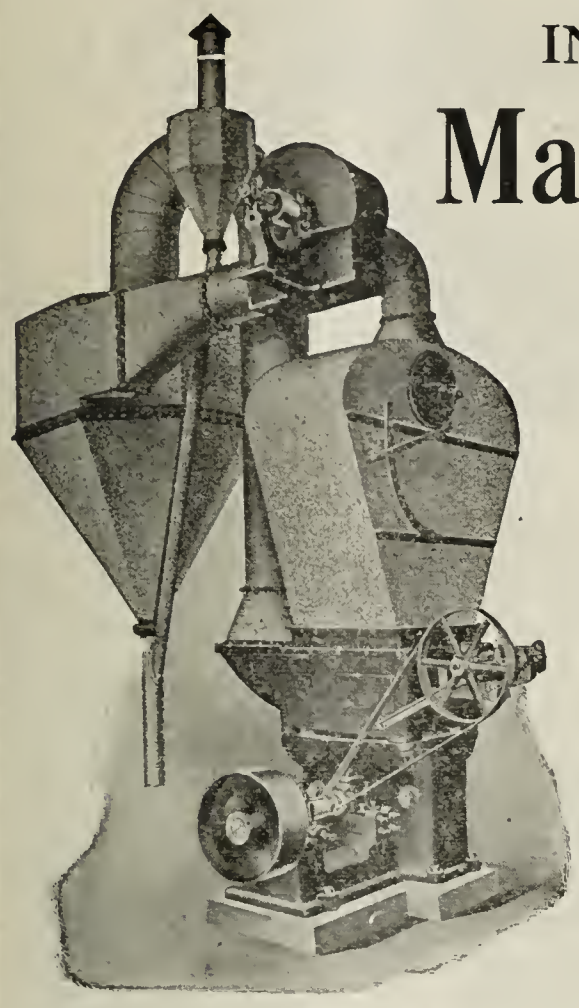
A few of the important features that cause progressive men to select Ruggles-Coles Dryers:

Minimum Power and Fuel Consumption
Uniform Drying
Large Capacity
Uninterrupted Service
Low Maintenance

Ruggles-Coles Engineering Company

50 Church Street New York City

Complete Grinding IN ONE Machine



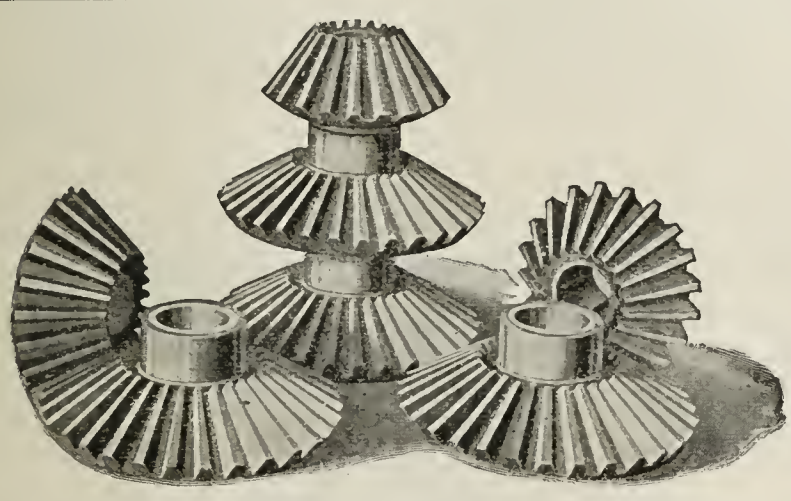
In successful use grinding Cement, Clinker, Limestone, Coal

INSTANT REGULATION OF FINENESS

NO DUST

Send for Circular

THE BONNOT CO.
CANTON, OHIO



Make Your Gear Service a Certainty

Ganschow Bevel Cut Gears—like Ganschow Gears of every kind—are cut with an accuracy and precision which makes smooth, easy, effective working a certainty. They minimize wear and tear and insure long life to the parts. From twenty to forty per cent less power is required to operate

Ganschow Cut Gears

as compared with cast gears, because of evenly-thick and evenly-spaced teeth, and because they are uniformly smooth. Throughout the whole machine the jar and strain are greatly reduced; and this means gear-efficiency from every standpoint.

As specialists in gear work, our splendid facilities enable us to take care of any requirement from the smallest gear up to 12 ft. in diameter—and do it QUICK. Every gear strictly according to specifications and free from defects.

How about YOUR gear requirements?

Wm. Ganschow Company, Chicago, Ill.
1003 W. Washington Street

VULCAN
Rotary Kilns

CHARGING and discharging are an uninterrupted process with VULCAN rotary kilns. Wet or crumbly materials are easier handled because there are no grates to clog. Perhaps your industry is of the kind—

Where Continuous Feed Is Essential or Desirable

Wet or Dry Cement Manufacture
Nodulizing Ores and Cement
Bituminous and Anthracite Coal Driers
Ore Roasting
Nodulizing in Blast Furnace Dust
Stone Driers for Limestone
Continuous Retorting in Chemical or Metallurgical Plants
Pulp Driers
Dehydrating
Oxidizing Processes
Sulphate Drying and many others

Write us for recommendations on design and construction

VULCAN IRON WORKS
ESTABLISHED 1849

1740 Main Street Wilkes-Barre, Pa.

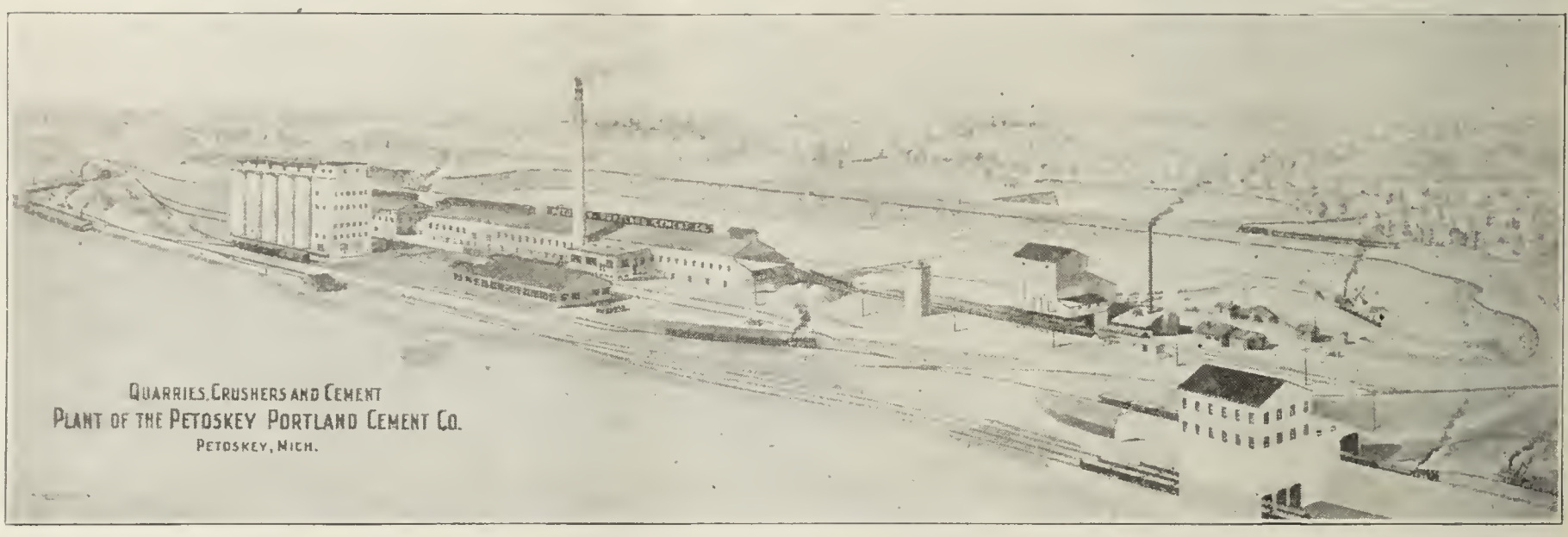
The New Plant of the

PETOSKEY PORTLAND CEMENT CO.

Designed and Built by J. C. Buckbee Co.

Is Equipped With

EDGE MOOR
WASTE HEAT BOILERS



The Waste Heat System installed at the Petoskey Portland Cement Company's plant was designed by the Edge Moor Iron Company and installed under their direction. It includes a special damper control and flue construction that they have developed, the high type of four pass Edge Moor boiler and specially constructed and arranged superheaters, economizers and fans that they have developed for this purpose. The Edge Moor Iron Company make complete installations and guarantee results. They have made installations for the following list of Companies:

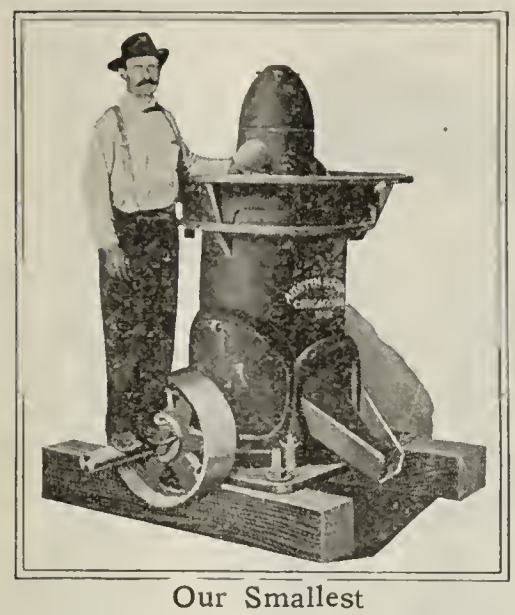
Alpha Portland Cement Company, Alsen, N. Y.
Alpha Portland Cement Company, Martins Creek, Pa.
Asano Portland Cement Company, Formosa Plant, Japan.
Asano Portland Cement Company, Kawasaki Plant No. 2, Japan.
Crescent Portland Cement Company, Wampum, Pa.
Dewey Portland Cement Company, Dewey, Okla.
Dexter Portland Cement Company, Nazareth, Pa.
Hokoku Cement Company, Japan.
Huron Portland Cement Company, Alpena, Mich.
International Portland Cement Co., Sierras Bayas, Argentine Republic.
Knickerbocker Portland Cement Company, Hudson, N. Y.
Marquette Cement Mfg. Co., La Salle, Ill.
Northwestern States Portland Cement Co., Mason City, Ia.
Petoskey Portland Cement Company, Petoskey, Mich.
Trinity Portland Cement Company, Eagleford, Texas.
Western States Portland Cement Company, Independence, Kas.

The Edge Moor Iron Company will be glad to make investigations and submit plans and proposals on request. Communications can be addressed either to Edge Moor, Del., or to the nearest Sales Office.

EDGE MOOR IRON COMPANY

EDGE MOOR DELAWARE

BRANCH OFFICES CHICAGO NEW YORK BOSTON



Our Smallest

When It Comes to Crushing Rock An Austin for Every Job

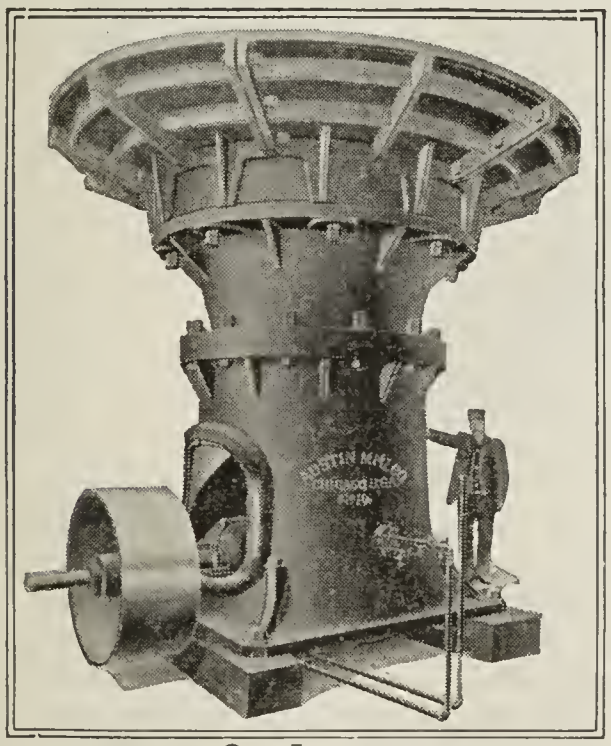
No matter what your requirements, you'll find one of the Austin Gyratory Crushers to exactly suit you.

See the two we picture here. Note the contrast in size. The big fellow dwarfs a husky man.

Eight Sizes 5 to 500 Tons Hourly Capacity

When you couple the superior operating advantages of the Austin Crushers, with the great economies effected by having a machine to turn out just as much rock as you need each hour with assurance of absolute reliability and durability—no waste power or labor—you'll understand why stone producers find Austins so satisfactory.

Catalog No. 28 describes the complete line of Austin Gyratory Crushers as well as other Austin rock equipment. Write for your copy at once.



Our Largest

Austin Manufacturing Company

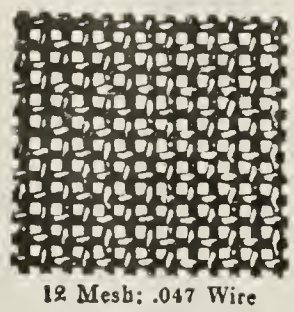
New York CHICAGO San Francisco

Canadian Agents: Mussens Limited, Montreal, Toronto, Winnipeg, Vancouver

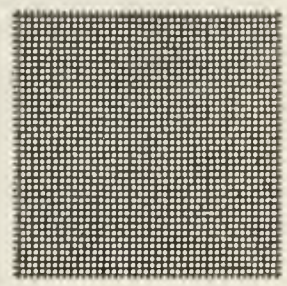
EXPORT DEPARTMENT
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
91 Chambers St., New York, U.S.A. Cable: Almacoa New York

Cleveland Double Crimped WIRE CLOTH

2½ Mesh; .105 Wire



12 Mesh; .047 Wire



40 Mesh, .0135 Wire

You should use our screens because a uniform fineness of screened product is assured by an even, accurate mesh. This is a characteristic of "Cleveland" Double Crimped Wire Cloth.

Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

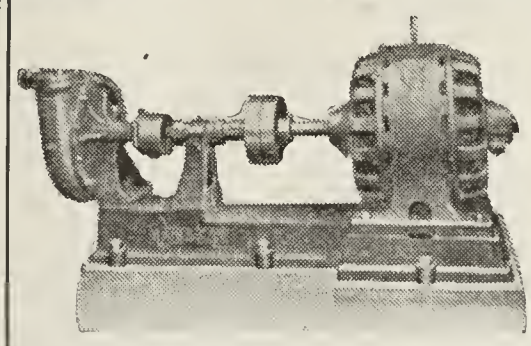
The Cleveland Wire Cloth & Mfg. Co.

3579 E. 78th Street, CLEVELAND, OHIO

AMERICAN

TRADE MARK REG'D. U.S. PAT. OFFICE

PUMPS



Built to Meet All Possible Power Plant Requirements

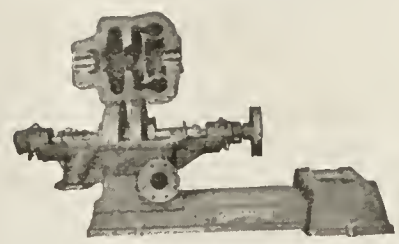
Fifty standard types of centrifugal pumps regularly built and special designs as wanted.

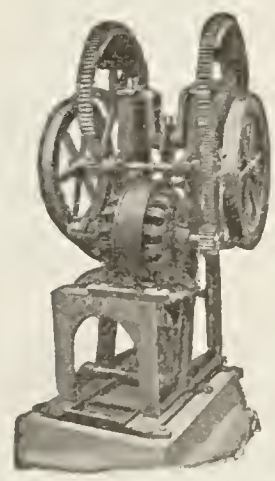
Also a complete line of deep well plunger pumps.

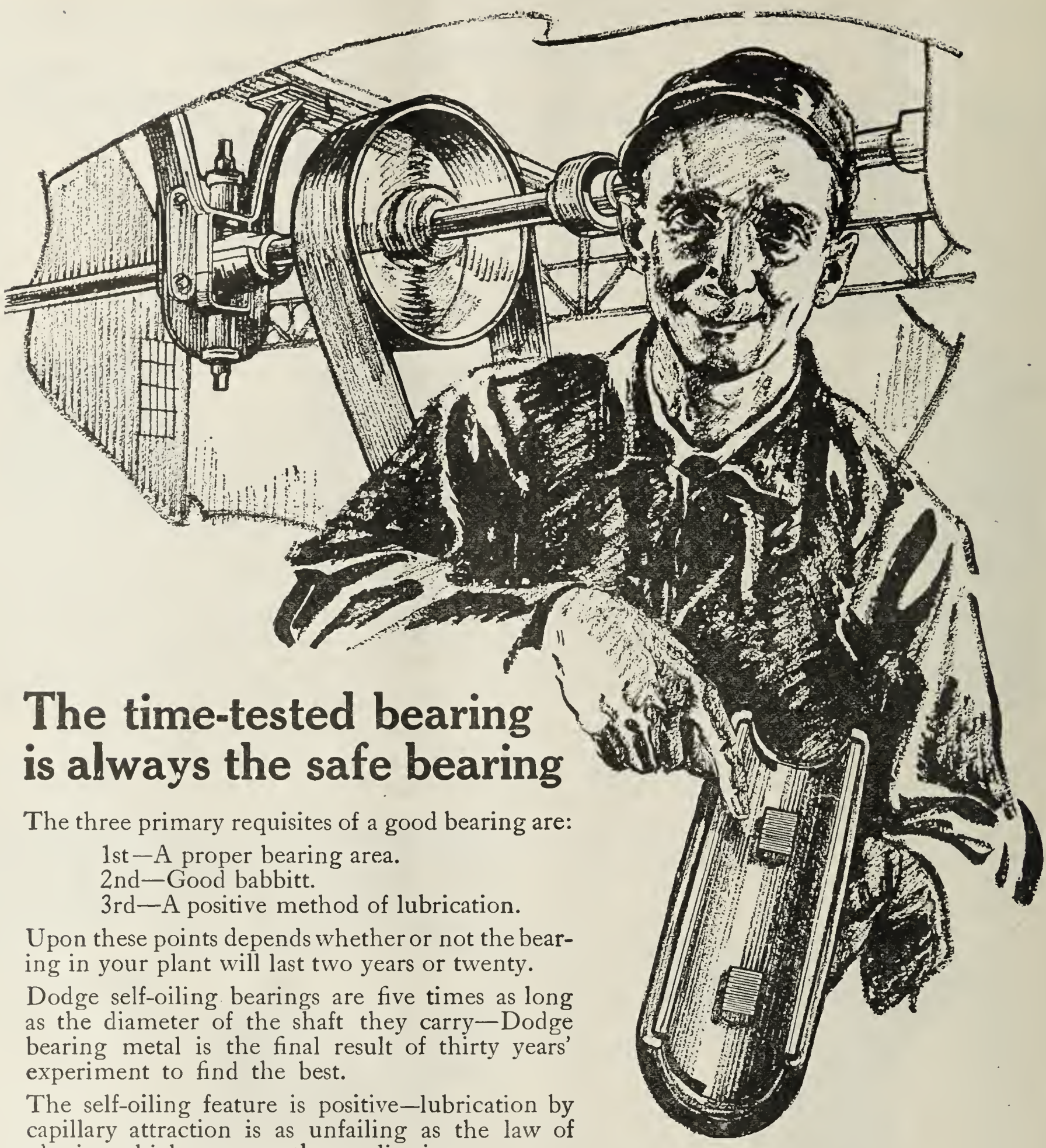
Write for Catalogs.

The American Well Works

General Offices and Works: Aurora, Ill.
Chicago Office: First National Bank Bldg.







The time-tested bearing is always the safe bearing

The three primary requisites of a good bearing are:

1st—A proper bearing area.
2nd—Good babbitt.
3rd—A positive method of lubrication.

Upon these points depends whether or not the bearing in your plant will last two years or twenty.

Dodge self-oiling bearings are five times as long as the diameter of the shaft they carry—Dodge bearing metal is the final result of thirty years' experiment to find the best.

The self-oiling feature is positive—lubrication by capillary attraction is as unfailing as the law of physics which governs the application.

Dodge bearings are built for long, hard service; when shafts are properly aligned and installed they constitute the most economical and least troublesome "roadbed for power" possible.

DODGE

Power Transmission Machinery

The capillary bearing is self-acting and needs but one filling of oil in each six months. Only clean oil reaches the shaft. The normal depreciation of this frictionless bearing will not exceed 2% per year. Can you find another lineshaft bearing that may boast as low an upkeep cost?

Dodge Sales & Engineering Company, distributor of the products of the Dodge Manufacturing Company and the Dodge Steel Pulley Corporation. General Offices: Mishawaka, Ind. Works: Mishawaka, Ind., and Oneida, N. Y.
Canadian Plant: Dodge Mfg. Co. of Canada Ltd., Toronto and Montreal

Philadelphia Cincinnati New York Chicago St. Louis Boston Atlanta Pittsburgh Minneapolis Dallas Providence Seattle Newark

Cement and Engineering News

Vol. 33 Chicago, March, 1921 No. 3

CONCRETE FRONT

Morris Plan Bank Building, New Haven, Conn.

The front elevation of this building reflects solidity, character and self-respect in a very definite way. It is built of cast stone ashlar laid up in alternate courses 4″ and 6″ thick.

In order to obtain the shade of color desired by the architect, the mixture used was one-half part gray Portland cement and one-half part Medusa white Portland cement, to three parts of marble aggregate graded down from ½″ to dust for the facing which was backed up with trap rock and dust concrete. The aggregates were mixed in a Kent Continuous Mixer.

The size of the Ashlar units is about 14″x24″. The stone is not a "concrete block" as that expression is ordinarily understood. "We do not manufacture concrete blocks; but all kinds of Cast Concrete Stone Trim for building," writes the Decorative Stone Co.

The above job was given a bush-hammered finish, 8 cuts to the inch.

The Decorative Stone Co., of New Haven, Conn., who did the above work started in the manufacture of Cast Stone 10 years ago; and the fact that it is still in the business today, is pretty fair proof of its products having found favor with architects, and others interested in building.

The Cement Manufacturers Before the Lockwood Committee

As previously recorded in this journal, a New York legislative committee has for some months been investigating the building industry of New York City. At the end of December it quizzed a number of eastern cement manufacturers in the endeavor to show that they control closely the distribution of cement and use that control as an element in fixing prices. The questioning was so conducted as to convey the impression that there was a strong case against the manufacturers. The testimony being available in full, a conclusion as to what was shown can be drawn.

Such examination leads to the conviction that, so far as this testimony goes, the case must be adjudged, "not proven."

It will be well to understand, first, the character of the proceedings. The investigation consisted solely in the questioning of subpœnaed witnesses by the counsel of the committee. That was all. Testimony was not taken under court rules of evidence. Witnesses were not allowed counsel; consequently there was no cross-examination to clarify the testimony or to show that it meant something different than was disclosed under the direct questioning. Counsel for the committee, Samuel Untermyer, a very sharp inquisitor, in trying to make a case against the witnesses asked only such questions and permitted such statements as would help to build up his case.

"Specific Job" Deliveries

His chief point of attack, in endeavoring to prove control and price fixing, was on the practice on "specific job contracts." These are contracts by which the manufacturer guarantees to supply a dealer at a definite price all the cement required for a specific job which will require shipments beyond a 15-day period. Mr. Untermyer endeavored to show that under these contracts if a dealer received and paid for cement in excess of the job's requirements, he would have to return the excess cement. It was clearly proved, however, that this could not be the case, first, because under the cement manufacturers' practice excess cement is not shipped to jobs, and, second, because on these contracts cement is not paid for when ordered but only upon shipment.

The purpose of the "specific job contract" is to allow a contractor to bid on a job with assurance that the cost of his cement will not increase, even if the job lasts one or two years. The benefit accrues also to the engineer and the owner, for without the "specific job contract" the former could not estimate with certainty cement costs on jobs, nor could the owner know in advance his probable investment. If under such a contract a dealer could get more cement than was required for the job covered, he would, in case the price went up, be able to get cement for general sale below the market price, thus taking advantage of the practice established for the purpose of stabilizing construction. On the other hand, if the market price should drop and the demand be slack the dealer would refuse to take the excess cement and possibly leave the manufacturer with a large stock which he had been reserving for this and for similarly cancelled options.

To prevent such over-ordering nineteen eastern manufacturers are operating the Cement Manufacturers' Protective Association, which distributes to its members a record of all "specific job contracts" that have been closed, and which, on demand of members, sends inspectors to these jobs to determine and report on the quantity of cement needed. In this way, only the amount of cement needed is shipped, the contract allowing cancellation of excess amounts.

Mr. Untermyer tried also to show close control by questions designed to indicate that for general sale, called "warehousing" in the cement trade, a dealer could contract only for the amount of cement that a manufacturer could ship him in 15 days, even though the dealer would pay for all the cement he could get. The testimony of the only manufacturer quizzed on this point did indicate such to be the practice. In fact, though, a dealer can, from some companies at least, contract for cement for warehousing over a period longer than 15 days, *but* the companies will guarantee the price for only 15 days. Moreover, depending on the usual manufacturers' precaution of seeing that all his customers are supplied and of not allowing one or two men to "hog" his output, the dealer can secure as much cement as he wishes. The testimony brought out that information is not exchanged regarding cement sold for warehousing, so that a dealer can buy large supplies simultaneously from several companies.

Statistics exchanged by the companies regarding stocks of clinker and cement on hand and amount of cement shipped were attacked as a means of controlling production. This was admitted by a manufacturer who said that they "assisted in preventing overproduction," but he maintained that the information was necessary for the intelligent direction of his business.

Prices

On the matter of prices, there was sharp questioning in an endeavor to prove collusive price fixing, but this line of examination failed to produce any supporting evidence. It was admitted by manufacturers that prices quoted by competing companies were never apart except for a few days at a time, but this, it was maintained, was normal in the marketing of a standardized product.

Also, there was endeavor to create the impression that the large size of some of the companies enabled them to control the market and that the profits have been large. One of the big companies declared last year a 50-per cent stock dividend on its common stock, and another— a 25 per cent stock dividend, but, against the wishes of the committee's counsel, the president of the first company slipped in the statement that his common stock had not paid a dividend for ten years.

Costs of cement, in relation to the manufacturer's selling price, received some consideration, but the resulting testimony was so confused as to allow no intelligible conclusion to be drawn.

The practice of charging, on direct sales to contractors, 10 cents per barrel more than to dealers, to which contractors have so often objected, was barely touched upon, and nothing informative brought out.

The inquiry as a whole may be summarized as follows:

It was unfair in its methods and failed to substantiate what the counsel for the committee endeavored to show—unfair control and price fixing. It did, however, give general publicity to the system of marketing cement, but the newspaper summaries conveyed to the public not what the testimony showed but what the counsel for the committee hoped that it would show.

Unsightly Concrete Surfaces

In ordinary commercial concrete construction is there any prospect of being able to make exposed surfaces of permanently good appearance without finishing treatment? Considerable economy should result from a successful answer to the question, since it would make possible a large reduction of the use of brick and tile facings now used solely to conceal unsightly concrete surfaces. It would also make it possible to avoid the distressing appearance of concrete structures on which such veneering has been omitted for reasons of economy. On bridges and important structures the exposed surfaces are often given special finishing treatment by washing, grouting and rubbing in order to secure a satisfactory appearance, but the effect thus obtained is sometimes of short life, being soon marred by the characteristic patches and streaks of discoloration. Painting is seldom employed and rarely successful. Cracks in the concrete have not been considered in the foregoing remarks, but in spite of reinforcement there is a frequent occurrence of such defects, which may be of little or no structural significance but are seriously detrimental to the appearance. There is an open fiield for developing concrete construction that can honestly show its own face without causing pain because of its unsightliness.

Important Change in Cash Discount

"One of the important considerations in the sale of Portland Cement to the public, aside from the elements of quality, price and delivery, is—the terms of sale," writes the Huron and Wyandotte Cement Companies.

"For years the general practice customary in the industry has been 'thirty days net,' with a fixed discount determined in cents per barrel for payment within ten days. In the old days, this amount per barrel was 1c (one cent); then it was increased to 2c (two cents); later, and finally, it was established at 5c (five cents) per barrel, which amount has been our discount to the trade for several years.

"The Huron and Wyandotte Portland Cement Companies, seeking to be guided by the most advanced commercial thought in constructively co-operating with its loyal customers in the furtherance of our mutual interests, and desiring to give our customers the benefit of all betterments and improved methods of doing business, that we can possibly formulate, as applicable to the "Cement Industry" consistent with our conditions, have decided upon and adopted the following important change in terms of discount, viz:—

"Effective February 3rd, on all invoices covering all shipments of 'High Grade' Huron and Wyandotte Portland Cements on current orders and new business, the terms of payment will be as follows, viz:—

"'Thirty days net, with a special discount of 10c (ten cents) per barrel for cash payment strictly within ten days from date of shipment.'

as against our former terms of 'thirty days net,' with a discount of 5c (five cents) per barrel for payment in ten days from date of shipment.

"This important step has been taken by us, as previously stated, not only in the furtherance of our long-established policy of giving 'Huron and Wyandotte' customers the benefit of any change or betterment that we are able to introduce in the business that will be to their advantage, but also made by us, at this time, in the furtherance of the 'Public Interest' in keeping with the trend of the times, to encourage economy and efficiency in the conduct of business. At the same time, we believe this liberal increase in our terms of discount will warrant and justify every Huron and Wyandotte customer in taking advantage of and receiving the benefit of the cash discount on the cost price of their cement per barrel, as the effective use of this liberal increased discount means a further substantial reduction in costs and will materially increase your profits accordingly.

"We are not unmindful of the loyal patronage of Huron and Wyandotte customers in all territories, and simply wish to take this further opportunity to remind you that the entire facilities of our producing and distributing plants are at your disposal, waiting to serve you, and we hope to have the pleasure of hearing from you frequently during the coming season."

Stucco Specialists Necessary for High Grade Results

There was a time when stucco was considered only as taking the place of wood siding. It was deemed to be more like a coat of paint and had no structural value in the builders' minds. However, the world of building has moved apace and the day of the specialist in stucco work is impending. Careful consideration of every detail in a stucco building is just as vital as the proper proportionment of the parts of a delicate engine.

The American Concrete Institute, a national organization of men who know how to build well is especially concerned in the question of good stucco. A recent report of this organization comments as follows:

"Successful stucco work depends in a large measure upon suitable design of a structure for stucco. Satisfactory results depend largely on the development of stucco specialists, experienced and skilled in this particular art, as distinguished from ordinary plastering. Intelligent and high class workmanship is so essential to good stucco that only those contractors who have had sufficient experience to establish their own confidence in the product and who are willing to guarantee their work, should be employed for its application."

Architects and builders alike share a responsibility that cannot be corrected after the building is under way. Good results in stucco are assured if those men only, who are thoroughly familiar with every phase of it are in charge of its application, and the details necessary for successful stucco are incorporated.

Mixers for Mortar and Concrete

"Builders' Mixers" is a bulletin issued by the American Cement Machine Co., Inc., Keokuk, Iowa. These mixers are used by contractors to mix mortar as well as concrete, and by so doing, it is said, they save 50 per cent of labor. Several illustrations display different types of these machines and their capacities, and operations are fully and pertinently described. Ample tables of dimensions are given, together with many other valuable facts.

Nebraska Cement Company builds reinforced double walls concrete houses with a dead air space

Frost System Hollow Wall Houses

Double wall concrete houses with a dead air space have been built economically by the Nebraska Cement Company of Superior, Nebraska, using Frost's wall forms made by the Hollow Concrete Wall Co., Mitchell, S. D. The accompanying illustrations show the construction of sixty houses and a three-story hotel for their employees.

After a thorough investigation of different hollow wall systems the Nebraska Cement Company decided on using the forms made by the Frost Hollow Concrete Wall Company. The pictures shown herewith give you an idea what they have done in less than four months with one set of forms. Mr. W. T. Groner, superintendent, Nebraska Cement Co., writes as follows:

"Regarding operation of forms, will say that we are well satisfied and do not believe there is anything on the market that could equal same for our requirements. They fulfill every claim you make for them regarding simplicity and economy of operation."

The Hollow Concrete Wall Company's headquarters are at Mitchell S. D., they have built houses in Lincoln, Plainview and Opportunity, Neb. Also at different parts of South Dakota as well as at their home in Mitchell where they have built a number of houses in different parts of the city and are now finishing the last of a group of eight dwellings in Capital Addition to Mitchell.

The Henningson Engineering Company have arranged for the use of the Frost system for building twenty-five residences at Hastings, Neb., and thirty houses at Council Bluffs, Iowa, as well as the exclusive use in their own city, Omaha, Neb.

The Hollow Concrete Wall Company had more business than they could take care of in 1920, but they enlarged their facilities for manufacturing and have increased their capital, so as to take care of their expanding business.

They have arranged with H. W. Remington, 59 Front St., New York, N. Y., to act as distributing

agent for the New England states and foreign countries, also a brother of the patentee O. J. Frost, 760 N. Rowen Ave., Los Angeles, Calif., is now making arrangements to take care of the western Pacific territory.

Flowability of Concrete Is Increased by "Over-Sanding"

During the past month, several series of tests of concretes made from Potomac River sand and gravel have been carried out by the United States Bureau of Standards, using various proportions of cement to aggregate from 1:1½:3 to 1:3:6 and with the extremes of flowability used in practical concrete construction work. The results of these tests emphasize a feature of considerable importance to the contractor. When aggregates are proportioned by volume measure, as is customary on most construction work, it is found that the use of wet aggregates requires ½ to 1 bag more cement per cubic yard of concrete than do dry aggregates.

Sand is generally wet or at least moist when used, so that the full difference may never be apparent in field practice, yet the use of sand from a pile which has just been exposed to rain will result in the employment of more cement for a given volume of concrete than would have been the case had the work been done on a dry day. The excess strength resulting from the increase in cement is unnecessary providing that designed strengths were obtained with the drier materials.

As above mentioned, this increased quantity of cement may be as high as one bag per cubic yard of concrete, and the increase in strength, due to the added cement in a cubic yard of concrete made with wet aggregates is roughly proportional to the increase in cement. Therefore, if there is a marked increase at any time in the moisture carried by the sand, the tendency on the job should be to use larger volumes of sand in the batch.

Marked improvement in the working qualities of the concrete will be noted under usual conditions when the relative volume of sand is increased and the gravel proportionately reduced. With well graded river sand and gravel, such as is available in the District of Columbia, the "over-sanding" may be beneficial up to the point where the volume of sand in the batch is equal to the volume of the gravel. Such concrete will not segregate for miximum flowability commonly used in construction work; it will be easier working, the quantity of cement required per cubic yard will be slightly less and there will be no reduction in compressive strength.

Monmouth Stone Co., Begins Operations With Big Blast

The Monmouth Stone Co., Monmouth, Ill., whose new crushing plant was but recently completed, began operations on Dec. 15, 1920, with a blast that loosened 85,000 tons of stone, requiring the use of 12,400 lbs. of dynamite at an approximate cost of $8,000.

People from all around the county neighborhood turned out to witness the blast, at the invitation of the stockholders and friends of the new company. It was really a local celebration.

Preparation for the blast that made available the stone for the crusher has been going on for a number of weeks past. Dozens of holes have been drilled, with Sanderson-Cyclone drills, into the solid rock about twelve feet apart. Into these holes 12,400 lbs. of dynamite was dropped. The shot was set off by means of electric blasting caps as detonators.

The Sanderson Cyclone Drill in action preparing to make the initial blast.

The Monmouth Stone Co., which was incorporated in June, 1919, by J. H. Jayne, J. W. Houston, A. V. Peterson, E. E. Wood, E. A. VanTuye and R. L. Everett, owns the quarry formerly operated by the Wahlbaum Quarry, which ceased operations about 33 or 34 years ago. Since then the quarry has been idle.

E. L. Shaw & Co., Chicago, Ill., designed the crushing plant and the crushing and other machinery for handling the stone was furnished by Allis Chalmers Co., Milwaukee, Wis. The steam shovels are equipped with Leschens wire rope.

The power for the plant is obtained from the Keokuk, Ia., dam over a power line constructed of three lines of No. 4 copper wire, with transformers, switches and all necessary wiring for the building of the line and bringing it to the plant. It comes into the transformers at 33,000 volts and approximately 1,000 H. P. is used for both lighting and power purposes. The building of the power line cost $33,000.

The capacity of the new plant will be 4,000 tons of crushed stone and 600 tons of agricultural limestone per 24 hours. The stone will be crushed in eight different sizes, from ¼ to 2½-in. Steel bins having a total capacity of 1,300 tons have been provided for storage.

The operating part of the plant, according to "Rock

The two steam shovels and a part of the transportation equipment in the quarry of the Monmouth Stone Co.

Products," is some different than the ordinary stone crushing plants, in that the main crushing machine is placed down in the ground instead of being elevated in the air, which would make it necessary to carry the stone from the cars, up to it. This excavation, made necessary for the largest crusher, is 32 feet deep and was blasted out of solid stone, then thoroughly concreted. The crusher is so arranged that a train of cars are passed by the mouth of the crusher and each car automatically dumps its contents into the opening. The four smaller crushers are placed on a large concrete foundation, 20 feet high.

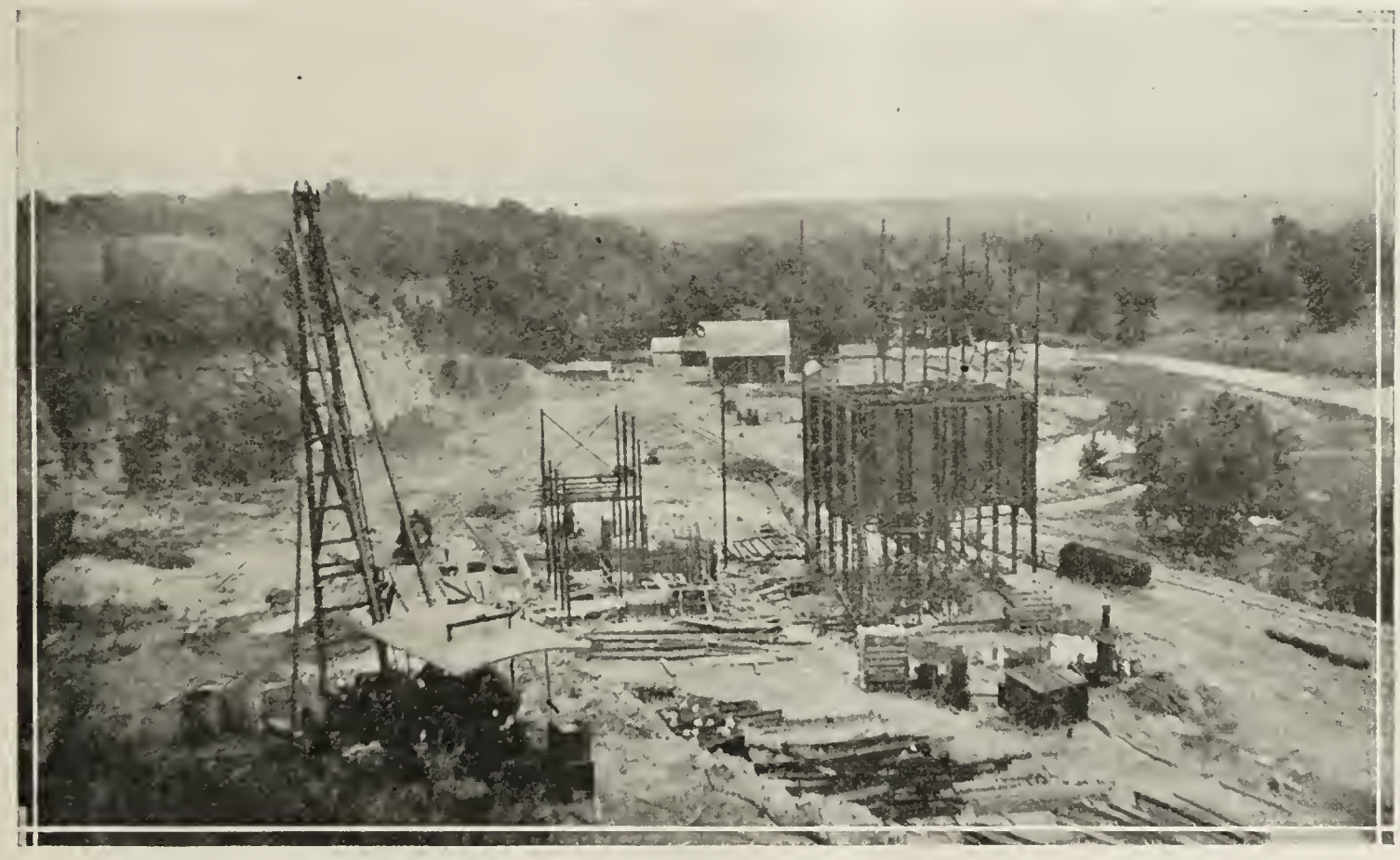
The company invested over $40,000 in railroad tracks and switches, having two sidings on the Chicago, Burlington & Quincy R. R., which will accommodate 8 empty cars. The company's own 60-ton switch engine will do the switching of cars, both on the siding and at the works, the quarry being located some 1,700 ft. from the main line of the C., B. & Q. R. R.

The concrete tile business has settled down to a steady, dependable demand. The records of each plant will show what sizes are most used. Work on these sizes during the winter. Get a stock in the yard so that you can tell a prospective customer that you have the goods all ready to deliver. That will make a hit with him, if he is in a hurry to get the work done.

In a great many localities the demand for blocks is also greater than local manufacturers can supply. Standard sizes should be made up during the winter, ready for quick deliveries when the construction season opens.

If a manufacturer's capital is not sufficient to finance two or three months of work with little income, he should make arrangements right now to increase his capitalization and put himself in a position where he can do this and meet his obligations promptly.

All plants must ultimately come to the all-year basis. The first ones to do it will reap the greatest benefit.



The Monmouth Stone Co. A view of the crushing and screening plant under construction

Winter Is the Time to Make Concrete Products

Practically no concrete products plants are now built without some provision for heating, so that work can be continued through the winter if the demand is sufficient to warrant it.

And the demand is going to be sufficient, if it has not reached that point already.

The history of 1920 in the concrete products business has been, in most localities, that the market has exceeded the ability of manufacturers to produce the material. There is every reason to believe that the coming year will show at least as great a demand.

Why not be prepared for it. Why shut down a plant during the winter, and then see profitable business going away from you in the spring because you are unable to make deliveries when wanted?

Cement Specifications Made Uniform

Complete agreement has been reached on specifications and tests for Portland cement, so there is now one specification covering both commercial and governmental use. Only minor changes were necessary in order to eliminate slight but long-standing discrepancies which had existed between the industrial specifications and those of the government.

The revised specifications, which were agreed upon by Committee C-1 of the American Society for Testing materials and the government Departmental Committee on Cement, have received the approval of the American Engineering Standards Committee.

Copies may be obtained from the American Engineering Standards Committee, 29 West 39th Street, New York, or from the American Society for Testing Materials. The price is 25 cents.

Portland Cement in 1920

Production Was 100,000,000 Barrels, Largest Yet Made

In the production, shipment and gross value of Portland cement, 1920 was a record year, according to estimates prepared under the supervision of Ernest F. Burchard, of the United States Geological Survey, Department of the Interior. The production is estimated at 100,302,000 barrels, and the shipments at 96,329,000 barrels, valued at $193,548,000, compared with 80,769,378 barrels manufactured and 85,596,616 barrels, valued at $146,656,076, shipped in 1919, an increase of 24 per cent in production, 13 per cent in shipments, and 31.9 per cent in value of shipments in 1920. The stocks of finished cement increased from 5,852,497 barrels at the end of 1919 to about 8,290,000 barrels at the end of 1920, or more than 41 per cent. The average factory price in bulk at the mills for the whole country was $2.01 a barrel in 1920, compared with $1.71 in 1919, an increase of 17.5 per cent.

The statistics for 1920 include reports from practically all manufacturers of Portland cement and are based on records for the first 11 months plus estimates for December. Some of the estimates for December may have been too large, so that when the final returns for 1920 are received the actual production and shipments may prove to be slightly lower and the stocks on hand slightly greater than the figures here given.

The statistics for 1919 presented herewith were collected by the Geological Survey in co-operation with the Bureau of the Census and may also be subject to slight revision. The estimates by the Geological Survey for 1919, published in February, 1920, came very close to these figures, the estimated production and shipments of Portland cement being respectively 0.6 per cent and 0.13 per cent low.

There were 115 plants that manufactured Portland cement in 1920, compared with 111 active plants in 1919, one additional plant each having operated in Alabama, Indiana, New York, and Oregon.

The production of cement was materially curtailed during the war, and after the armistice was declared the expectation of lower prices slackened building operations during the first half of 1919. The demand for cement was therefore so slow that production was held down below normal. Finally the "underbuilt" condition of the country forced building in spite of high prices, causing a demand for cement that resulted in a shortage of it late in 1919. The stocks dropped from about 10,500,000 barrels at the beginning of 1919 to less than 6,000,000 barrels at the end of that year. At the beginning of 1920 there was the usual lull in building operations that comes in winter, but the production of cement was more active than a year earlier and continued to rise until it reached the peak in October. During the last two months of 1920 there was a decline in activity after the building season had passed. The stocks at the beginning of 1920 were lower than at the beginning of any other year since records have been kept by the United States Geological Survey, for four or five months they gained slowly, but from May until October they dwindled rapidly, almost vanishing at some plants. In November and December the production was not curtailed in proportion to the decline in demand, and stocks once more began to accumulate, so that at the end of the year more than a month's supply was becoming seasoned for use in 1921. When future demand and price are uncertain the accumulation of large stocks of cement in winter at current costs becomes a serious problem, for though it might be desirable to have large stocks on hand ready for a possible spring demand, the uncertain conditions of the market during the last few years have caused a lack of confidence in the future. Aside from market conditions, many other factors vitally influence the cement industry: since the end of the war transportation facilities have remained inadequate both for raw materials and for finished products, and the supply of coal and labor has been short, and when these conditions prevail during the building season the result is a shortage of cement, which naturally raises the factory price somewhat and gives opportunity for dealers to increase greatly the price to the consumer.

The conditions were generally better in 1920 than in 1919, though most plants felt the cessation of demand and lowered prices at the end of the year. The prevalent handicaps, especially labor troubles, proved too

Portland Cement Produced and Shipped in the United States, 1919 and 1920, by Districts

District—	Production						
	Active plants		Quantity (barrels)		Percentage of increase	Stock (barrels)	
	1919	1920	1919	1920	1920	1919	1920
Lehigh district (eastern Pennsylvania and New Jersey)	20	20	22,747,956	25,448,000	12	2,272,911	1,982,000
New York	8	9	4,383,579	5,940,000	36	711,504	494,000
Ohio and western Pennsylvania	8	8	6,599,820	7,454,000	13	347,438	775,000
Michigan and northeastern Indiana	12	13	5,047,395	5,303,000	5	264,404	639,000
Southern Indiana and Kentucky	3	3	2,490,497	3,213,000	29	99,626	252,000
Illinois and western Indiana	6	6	9,088,081	13,190,000	45	302,724	1,087,000
Maryland, Virginia, and West Virginia	4	4	2,469,768	3,050,000	23	100,193	246,000
Tennessee, Alabama, and Georgia	4	5	2,744,646	2,764,000	1	37,235	227,000
Iowa, Missouri, and Minnesota	10	10	10,038,625	12,396,000	23	366,193	1,140,000
Nebraska, Kansas, Oklahoma and Central Texas	15	15	6,142,538	8,072,000	31	476,909	576,000
Colorado, Utah, Montana, and western Texas	8	8	2,811,843	3,765,000	34	221,119	226,000
California, Washington, and Oregon	13	14	6,204,630	9,707,000	58	652,241	646,000
	111	115	80,769,378	100,302,000	24	5,852,497	8,290,000

District—	Shipments						
	1919		1920		Percentage of change in quantity	Average factory price per bbl.	
	Quantity (barrels)	Value	Quantity (barrels)	Value		1919	1920
Lehigh district (eastern Pennsylvania and New Jersey)	23,501,560	$ 38,511,273	24,984,000	$ 47,735,000	+ 6	$1.64	$1.91
New York	4,441,250	7,700,406	6,049,000	11,971,000	+36	1.73	1.98
Ohio and western Pennsylvania	7,102,442	12,144,272	6,947,000	13,482,000	— 2	1.71	1.94
Michigan and northeastern Indiana	5,459,439	9,274,025	4,920,000	11,986,000	—10	1.70	2.44
Southern Indiana and Kentucky	2,640,556	4,405,939	3,083,000	6,339,000	+17	1.67	2.06
Illinois and western Indiana	9,932,158	16,092,758	12,409,000	21,916,000	+25	1.62	1.77
Maryland, Virginia, and West Virginia	2,613,963	4,517,591	2,911,000	6,087,000	+11	1.73	2.09
Tennessee, Alabama, and Georgia	2,830,588	4,952,245	2,580,000	5,668,000	— 9	1.75	2.20
Iowa, Missouri, and Minnesota	11,440,645	19,314,646	11,593,000	22,423,000	+ 1	1.69	1.93
Nebraska, Kansas, Oklahoma and Central Texas	6,292,741	11,583,736	7,981,000	16,161,000	+27	1.84	2.02
Colorado, Utah, Montana, and western Texas	2,982,048	5,939,933	3,748,000	8,244,000	+26	1.99	2.20
California, Washington, and Oregon	6,359,226	12,219,252	9,124,000	21,536,000	+43	1.92	2.36
	85,596,616	$146,656,076	96,329,000	$193,548,000	+13	$1.71	$2.01

great for some plants, which were closed for long periods. About half a dozen widely separated plants reported conditions about the same as in 1919.

There were increases in production and in the average selling price of Portland cement in every state and district. Although there were decreases in shipments in 3 districts and in 3 states, ranging from 2 to 11 per cent, the gross value of shipments in all states and districts increased. The increases in production ranged from 1 per cent in the Tennessee-Alabama-Georgia district to 64 per cent in the State of Washington. The lowest average price reported by any group of plants in 1920 was $1.77 a barrel in the Illinois-western Indiana district, and the highest average price was $2.47 in Washington. These prices compare with $1.62 and $2.05 in 1919 in the same localities.

Market prices on Portland cement in carload lots in bulk, as quoted by the Engineering News-Record, ranged in January, 1920, from $2 a barrel at Chicago to $3.12 at Denver. These may be compared with quotations of $3.05 and $3.67, respectively, in January, 1919. In Chicago prices remained steady until June, when they advanced to $2.15, and in October they reached $2.35. In Denver the price of $3.12 in January gave way to $2.82 in March, but in July there was a sudden increase to $3.80, followed in October by a reduction to $3.25. Quotations at San Francisco and Dallas were generally intermediate between those at Chicago and Denver. The average wholesale prices of cement per barrel in New York City by months during 1920, according to Dun's Review, were as follows: January, $3.37; February, $3.40; March, $3.40; April, $3.56; May, $4.33; June, $4.58; July, $4.80; August, $5.10; September, $5.06; October, $4.98; November, $5.10; and December, $4.92.

In the calendar year 1920 498,036 barrels of cement of 380 pounds were imported into the United States, valued at $1,229,431, or $2.47 a barrel. The exports during the same period amounted to 2,985,807 barrels, valued at $10,045,369, or $3.36 a barrel. The exports for 1920 exceeded the exports for the year 1919 by 522,118 barrels. The exports were largest in March, 369,640 barrels, and least in July, 156,713 barrels. The figures showing the imports and exports were compiled from the records of the Bureau of Foreign and Domestic Commerce, Department of Commerce, and are subject to revision.

The accompanying tables show by states and by districts the actual production, shipments, value, and stocks of Portland cement for 1919 and estimates of the same items for 1920.

Portland Cement Produced and Shipped in the United States, 1919 and 1920, by States*

State—	Production						
	Active plants		Quantity (barrels)		Percentage of increase	Stock (barrels)	
	1919	1920	1919	1920	1920	1919	1920
California	8	8	4,642,679	6,995,000	51	431,355	372,000
Illinois	4	4	4,206,918	5,638,000	34	18,125	441,000
Indiana	5	6	7,262,454	10,700,000	47	435,985	909,000
Iowa	4	4	3,573,278	4,813,000	35	126,162	487,000
Kansas	7	7	2,927,270	4,301,000	47	220,994	343,000
Michigan	11	11	4,675,244	4,808,000	3	210,404	588,000
Missouri	5	5	5,216,347	6,039,000	16	160,123	514,000
New York	8	9	4,383,579	5,940,000	36	711,504	494,000
Ohio	5	5	1,637,418	1,790,000	9	82,614	182,000
Oklahoma	3	3	1,354,130	1,552,000	15	88,452	112,000
Pennsylvania	21	21	25,325,173	28,365,000	12	2,429,034	2,330,000
Texas	5	5	2,249,735	2,509,000	12	205,918	101,000
Utah	3	3	819,861	1,060,000	29	34,295	73,000
Washington	4	4	1,393,907	2,290,000	64	196,393	222,000
Other States†	18	20	11,101,385	13,502,000	22	501,159	1,122,000
	111	115	80,769,378	100,302,000	24	5,852,497	8,290,000

State—	Shipments						
	1919		1920		Percentage of change in quantity	Average factory price per bbl.	
	Quantity (barrels)	Value	Quantity (barrels)	Value		1919	1920
California	4,743,336	$ 8,860,196	6,920,000	$ 15,932,000	+46	$1.87	$2.30
Illinois	4,873,831	7,901,689	5,205,000	9,439,000	+ 7	1.62	1.81
Indiana	7,667,976	12,527,770	10,245,000	18,910,000	+34	1.63	1.85
Iowa	4,569,110	7,798,347	4,437,000	8,676,000	— 3	1.71	1.96
Kansas	3,023,901	5,467,284	4,165,000	7,773,000	+38	1.81	1.87
Michigan	4,990,308	8,468,196	4,426,000	10,785,000	—11	1.70	2.44
Missouri	5,496,164	9,264,017	5,671,000	11,231,000	+ 3	1.69	1.98
New York	4,441,250	7,700,406	6,049,000	11,971,000	+36	1.73	1.98
Ohio	1,821,597	3,311,179	1,691,000	3,724,000	— 7	1.82	2.20
Oklahoma	1,350,601	2,578,571	1,527,000	3,280,000	+13	1.91	2.15
Pennsylvania	26,250,077	43,126,528	27,669,000	52,349,000	+ 5	1.64	1.89
Texas	2,318,747	4,226,222	2,639,000	5,797,000	+14	1.82	2.20
Utah	935,305	1,906,816	1,021,000	2,290,000	+ 9	2.04	2.24
Washington	1,402,616	2,868,599	1,810,000	4,462,000	+29	2.05	2.47
Other States†	11,711,797	20,650,256	12,854,000	26,929,000	+10	1.76	2.09
	85,596,616	$146,656,076	96,329,000	$193,548,000	+13	$1.71	$2.01

*Statistics for 1920 are estimates and subject to revision.
†Other States: Alabama, Colorado, Georgia, Kentucky, Maryland, Minnesota, Montana, Nebraska, New Jersey, Oregon, Tennessee, Virginia, West Virginia.

Making Concrete Blocks by the Wet Process

The cost of making concrete blocks depends largely upon the speed with which they can be cast and also on the number that can be cast at one time. One of the advantages of gang molds is that a considerable number of blocks can be cast at the same time from a comparatively large amount of concrete and the cost of the molds, considering the number of blocks that can be turned out, is small.

The molds made by the Flexo Concrete Mould Co., 216 Masonic Temple, Cedar Rapids, Ia., have several advantages. They use wet concrete in making the blocks and the concrete is poured into position just as in reinforced concrete work. This poured concrete is very dense and has great strength.

The molds are made of metal and are poured in gangs, which cuts down labor costs and results in high quality blocks of uniform density and appearance. The blocks are shaped in the form of an "H," which makes them practically a hollow wall, with the two parts held together by a series of webs.

The blocks are cast face up and the manufacturers say that a rock faced block can be secured in which no duplications are made in any of the blocks.

Flexo moulds are galvanized and rust-proof and are manufactured under patented rights. Send for details and learn of their special offer.

Announcing a New Explosive

The Atlas Powder Co., Philadelphia, Pa., has succeeded in producing a non-freezing explosive, the qualities of which are of such a distinctive type that it is bound to be welcomed eagerly by all blasting operators and especially by those who do cold weather blasting.

Briefly, the qualifications of Atlas Non-Freezing may be stated as follows: (1) Five grades for every blasting requirement; (2) cannot freeze at any temperature; (3) withstands the heat of summer; (4) its stability avoids premature explosions (nothing weaker than a No. 6 blasting cap should be used to detonate it); (5) will not cause headaches to those who use and handle it; (6) made in all standard size cartridges.

Five Grades—This means that there is sufficient variety to meet every blasting requirement. In order to determine which is the proper grade for a particular piece of work, it is advised that the consumer consult with the Atlas Powder Co. and state exactly what the nature of the work is and what results are desired. The company's service division, which consists of men with expert knowledge and years of experience in the use of explosives, will recommend, after making careful investigation, the grade which will bring about maximum results.

Cannot Freeze—There is a volume of significance in this qualification. We can get an idea of what this means by reminding ourselves of the difficulties that the users of explosives must overcome when blasting in cold weather. If the temperature of the atmosphere is 40 degrees or lower, a stick of dynamite becomes a dangerous substance. No one is fool-hardy enough to attempt to use chilled or frozen dynamite, until he has thawed it completely. Many hazardous methods of thawing dynamite are being followed by blasters. The most common is by setting the sticks on end in front of an open fire. Another is by placing the sticks in warm water. Other methods are to put the dynamite near or under stones or boilers, or on top of boilers. It is wrong even to suggest any of these methods, because they are extremely dangerous for reasons that are too numerous to mention. There is only one safe way of thawing frozen dynamite and that is in following the methods recommended by the explosive manufacturers.

"Cannot freeze," applied to the new Atlas explosive, gives positive assurance of an explosive which can neither be chilled nor frozen and which can be used and handled with no decrease in its effectiveness in weather when the temperature is below zero. Here at last, is an explosive which defies all degrees of cold or heat, in which man may live, to change or effect its ingredients. All its qualities remain continually at the same high standard in the heat of summer as well as in the extreme cold of winter. Because of this fact, thawing or "doctoring" is not necessary and should not be attempted with Atlas Non-freezing. These distinctions are of special importance to quarries which continue their blasting during the winter months. No thought of "might freeze" is ever associated with Atlas Non-freezing. No need to worry about the possibilities of a misfire or a poor shot on account of chilled or frozen dynamite. No need of taking the risk of inefficient loading, which usually happens when the explosive charges must be placed hurriedly for fear of chilling.

But the qualifications of Atlas Non-freezing do not end here.

No Premature Explosions—This feature is indicative of the great stability of Atlas Non-freezing. It requires a No. 6 blasting cap to detonate it successfully. That means that no ordinary blow or shake-up can be the cause of an explosion. Moreover, this stability remains unaltered and the explosive charge is always in perfect condition for effective detonation.

No Headaches—This is a feature which particularly those who handle and use ordinary dynamite can appreciate, for, in the majority of cases, men experience a throbbing headache as a result of handling dynamite. Because Atlas Non-freezing will not cause headaches, the good-will and cheerful spirit of the men who handle it are retained. Every superintendent knows how vitally important this feature is.

It Will Not—

Freeze.
Need to be thawed.
Explode prematurely.
Cause headaches.

It Will—

Do effective blasting.
Bring about desired results.
Remain perfect in zero weather.
Withstand heat of summer.
Avoid hasty loading of bore holes.

The Atlas Powder Co. makes every effort to bring about maximum results in the use of explosives and is pleased to meet the particular needs of individual concerns, no matter how unusual conditions are. It is advised that every concern consult the Atlas service division and receive, as a result of this co-operation, the proper explosive for their blasting requirements.

Elevators and Conveyors Catalog

Dodge Sales & Engineering Co., of Mishawaka, Ind., announces the publication of a catalog on Dodge standardized elevators and conveyors. The catalog is one of the most comprehensive that has ever been issued covering the above subjects and should constitute a text book on the subject which is covered in detail. The complete tables of data incorporated in the catalog represent an immense amount of work on the part of the Dodge Sales & Engineering Co. Elevator and conveyor tables used in this catalog are based on maximum conditions for the different carrying parts, rather than assuming conditions and working out a design for that particular condition. An interesting feature is the simple manner in which designs involving gearing are worked out, whereby almost any drive, whether for a conveyor, elevator or other speed reduction, can be picked out of tables; pitches, numbers of teeth and shaft sizes. All details are thus solved without any complicated calculations. The catalog is standard Dodge size—6 by 9 in., and is printed on fine enamel stock paper, the whole containing 160 pages and about 150 illustrations. The catalog has been in preparation for over a year and a half and no effort or expense has been spared to make it comprehensive in every detail. The catalog was prepared under the direction of A. O. Gates, M. E., of the Dodge Sales & Engineering Co., whose method of design of bucket elevators has resulted in greatly improved elevator practice in plants in all parts of the world.

A Specially Made Transmission Belt That Is Used on Hard Drives Only

By J. R. Hopkins*

The advertising propaganda of the Chicago Belting Company has to do with the merchandising of a staple product that has been in general use for generations in every mill or factory. Our advertising must reach and interest a class of buyers who have been buying belting for years, often for all of their business lives. In addition to our regular advertising campaign designed to interest these men, we have in our line a certain patented belt that is manufactured by none of the other 200-odd belting manufacturers and one that is used to strengthen our appeal on our general line as well as to establish an individual demand for that particular belt.

White Strip belting is a specially made transmission belt that is used on hard drives only. It is a patented belt made of two plies of oak-tanned waterproof leather with a strip of thin, hard rawhide in between—a three-ply belt. The rawhide is quite hard, and together with the two plies of oak-tanned leather, makes a belt that cannot be used on pulleys smaller than six inches in diameter, as the belt is too stiff to bend to the smaller circumferences. It is much the strongest belt made anywhere, as the rawhide strip alone has three times the tensile strength of leather.

The use of this remarkable belt is, however, limited to special drives where an ordinary good leather belt is not strong enough, or where the belt is subjected to a large overload. Its more general use is prohibited by its cost, which is considerably higher than that of regular first-grade leather belts. For most drives, a first quality leather belt in either one, two or three plies is the ideal belt, and is strong enough to last anywhere from a few years to fifty years. There are today leather belts in daily operation that have seen service for over fifty years, and their days of usefulness are not yet over. For such drives, the added strength of the more expensive White Strip belt is not necessary.

However, in nearly every industry there is some one drive where the overload is so great, and the strain due to a constant change of speed from high to low is so severe, that prior to the invention of our White Strip belts there was no belting, not even excepting oak-tanned leather, that could stand the punishment for very long.

Such a drive is the one operating centrifugal machines in sugar plants. This machine, which looks something like an enormous coffee percolator, is the one used to separate the sugar crystals from the syrup in the magnum, which is composed of raw sugar crystals swimming in syrup. The centrifugal receives a charge of about nine hundred pounds of magnum, and the power is then thrown on, the machine revolving at high speed and operating on the same principle as a cream separator. The centrifugal force sends the syrup to the top, where it flows off, leaving about five hundred pounds of raw sugar in the machine. The magnum is quite thick, and considerable power is required when the machine is started, as it is speeded up to a very high speed in jig time. This operation is repeated all day long and the enormous overload that the belt has to endure through so many successive startings and stoppings is too severe for most belts, and few indeed last very long. On this drive the enhanced strength of White Strip makes it an ideal belt, as it not only outlasts by considerable any other belt, but the machine's output is increased. The comparatively high first cost becomes a minor consideration, which is more than offset by the lengthened period of useful life of the White Strip belt.

On such a drive as this, White Strip is a godsend to the plant superintendent. Installing his first White Strip belt with perhaps a somewhat dubious feeling that this new belt would be an improvement on this troublesome drive, he rapidly becomes a White Strip enthusiast, as the belt continues to do its work long after the allotted time during which his previous belts have given way. It is but natural for him to assume that the belt maker who made the White Strip very probably makes his regular belts better also, and before long we have one more Chicago Belting equipped plant.

The application of White Strip to centrifugal drives in the sugar industry is typical of many other extremely difficult belt drives that are scattered through other industries. The grinding and pulverizing mills in cement plants, cold saws in steel mills, large band saws in saw mills, and Jordan beaters in pulp and paper mills, are good examples. Each one of these drives is known as being very hard on belts, and the problem of supplying belts is often quite troublesome until White Strip belts are installed.

It is also to be remembered that the Chicago Belting Company builds belts for every type of drive. Our engineering service department makes a study of all of the various drives used in each industry, and our salesmen are enabled to make a recommendation which is, in every case, based upon sound engineering practice.

Its field of usefulness is limited, and our sales campaign on White Strip is more or less confined to that field. As general publicity material, its chief significance is perhaps in the thought that the most difficult of all belt problems has been successfully solved only by the Chicago Belting Company.

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*Advertising Manager, Chicago Belting Co.

Impervious White Cement Floors

Concrete floors in banks, offices and public buildings are subjected to more or less severe conditions. Often excessive troweling, to make them smooth and less porous, causes cracks and crazing, and unless specially treated they will absorb more or less dirty water tracked in from the street or from mopping, and the effect that the architect strived to obtain is soon lost. In such cases specify:

1 part Medusa Waterproofed White Portland Cement.
2 parts crushed marble (⅛-inch to 40 mesh sieve).

If a coarser grain is desired, add two to three parts of a larger stone. Mix wet. After being struck off, it should be allowed to set for a sufficient length of time to become firm before finishing with a steel trowel (excessive troweling is dangerous). Allow to set for three days, keeping wet, then rub with stone or rubbing machine to remove trowel marks and cement film. Scrub with 10 per cent solution muriatic acid and thoroughly rinse with clean water. Grout into the surface a mixture of 1 part of the cement and 1 part of fine marble. Allow to set for one week or more, keeping the work damp. Then rub with stone or rubbing machine until desired surface is obtained. Floors can be brought to a polish by this method.

Earth Concrete for Road Construction

In March, 1918, a local man came to a meeting of the County Road Commission and presented some examples of road building material which he said had been mixed several years previously and had been going through a natural hardening process since that time. He desired to interest us in building a piece of road under his process; knowing that the inventor was not a chemist of repute and neither had he a substantial business reputation in the community, we were skeptical regarding the merits of his proposal and hesitated giving his claims serious consideration; however, he frequently renewed his appeal relative to putting the discovery to a practical traffic and climatic test, it was necessary for him to work through a road building organization to get the process demonstrated, and in July, 1920, we consented to add a section of this new type to the concrete road we were then constructing; the demonstration is on Knapp Road close to Grand Rapids in a location having about four per cent grade; the soil along the way and in the construction is red clay showing a slight trace of sand, writes Alvah Brown, chairman, Board of County Road Commissioners, Grand Rapids, Mich.

The process calls for mixing five parts of clay, sand, gumbo, muck or soil free from vegetable matter, or a mixture of two or more of any of these varieties with one part of cement; the clay or soil must be pulverized and should be mixed with the cement in the ordinary way; dissolve in the water to be used, four ounces of Earthcrete for each sack of cement that is employed in the batch being mixed; sufficient water must be impregnated with the chemical so that all particles of the batch are moistened and thereby come in contact with the chemical through this medium; if it is found that more water is required for any batch, it may be added without being chemicalized.

This material is laid between side-boards the same as ordinary road building concrete and is allowed to dry and set before being used for traffic; a longer period should be allowed for drying as clay and soil hold the water a greater length of time than is the case when crushed rock, gravel and sand is employed; this feature has some advantages in building a concrete road; because of its slow drying and setting, there is not so much need of the finished work being covered with earth to prevent the moisture leaving too quickly as is the case when the usual material is employed; we are not sure that a covering of earth is at all necessary when clay is used in the mixing.

Our experience has been limited, but the close observation we have given this development, inclines us to the belief that the discovery is going to be a success; nevertheless, we are watching for something to go wrong, which is prompted by our anxiety for absolute assurance that this process is practical.

The road in question was made eight inches thick, sixteen feet in width and was completed in July, 1920; it went through the dry and hot weather of the summer and has been subjected to traffic and unusual moisture through the heavy snow and rainfalls in the fall and winter and it has met with severe freezing, too.

On account of the peculiar winter, it looks as though this road had passed through an unusual weather test; if it was going to absorb an excessive amount of water, which we suspected, the soft winter weather, the absence of sunshine and frequent freezing should have developed defects; we are inclined to believe that the structure does not absorb an abnormal amount of water and therefore does not meet with damage through exposure to heavy freezing.

Four ounces of Earthcrete are required for dissolving in water for a one-sack-cement-batch and the Earth Concrete Company of Grand Rapids, Michigan, intends furnishing this in bulk quantities at low cost; a cubic yard of crushed rock and sand or gravel will be displaced by earth material found along the way by addition of chemical costing less than one dollar.

Many samples made from all varieties of earth are on exhibit, which indicate the truthfulness of the statement that any earth material found along the way may be used in the structural work; it is interesting to know that samples of concrete made of quicksand under this process, are about the hardest and look as though they would give the greatest wear of any of the exhibits.

We are disinclined to believe that a concrete road built of clay will serve as well as concrete made of crushed rock, or washed gravel when the surface is exposed to wheel traffic; however, its low original cost will no doubt warrant the building of clay or sand concrete roads under this process in territory where gravel and rock deliveries are expensive, and if the surface wears rough, then a thin covering of other wearing material may be applied.

It has been pointed out, that this mixture having been laid as a foundation for Asphalt, Tarvia, Willite or brick, will last as long as any other base inasmuch as its surface is not subjected to traffic wear; if this proves to be true, as indications point, this process will be very valuable for use as a base for city street building as all material found along the way may be employed, thus saving the expense of carting it away and avoiding the purchase and hauling expense of crushed rock, sand or gravel as the usual specifications now provide.

Many inquiries have been made for samples of the finished product and the company is also burdened with requests for samples of experimental quantities of Earthcrete and they are sending four ounces of the latter by mail for one dollar to any interested parties and very shortly will be organized and equipped to quote and furnish chemical in bulk quantities.

Letters of patent have been applied for to cover the chemical mixture.

New Book

The Century Co., 353 Fourth ave., New York, N. Y., have published a new book entitled, "The New Stone Age," by Harrison E. Howe of the National Research Council.

This is the story of cement and concrete and it is a wonderful story—as full of romantic interest, of surprise and suspense for the general reader as many a good novel. As the author points out, we moderns would find it quite possible to surpass the pyramids of old if there were now any market for pyramids.

"The New Stone Age" is the story of cement and concrete presented from the scientific standpoint but in non-technical language. The book tells the past history of cement and concrete, discusses the raw materials necessary for the different types, explains their preparation, tells the parts chemistry and other sciences play in cement and concrete, sets forth scientifically exactly what happens when they set and harden, and tells of the various usual and unusual uses of this extraordinary material which modern science has developed to help solve our problems.

The author is a recognized authority, and he writes with the interest-compelling vigor of an enthusiast.

Why Contractors Should Carry Insurance—Liability Laws Vary in Various States

BY R. R. RAWLE

The Rockwood-Badgerow Co., Chicago, Illinois

Building contractors assume considerable responsibility in cases of accidents on the job, as is shown in the accident experience record covering building construction. These may occur to the men in the contractors' employ or to other people who come to the job. Compensation and liability insurance is provided by all the leading insurance companies to cover the entire responsibility of the contractor. Full coverage of this kind is very essential. In fact, there is no contract previous to starting work which is of more importance than that of insurance.

Like a good many other things there are all kinds of insurance contracts—varying degrees of merit and demerit. Insurance is the last thing in the world with which to experiment, for at this day and date, have we not had sufficient demonstration of the fallacy of "Something good for nothing." Therefore, the contractor should select the insurance company with the same degree of interest and care that he exercises in selecting his bank.

The Compensation Laws which exist in a number of states cover certain stipulated schedules of pay for the loss of time, medical expense, dismemberment, disfigurement, and loss of life, accidentally suffered by employees, and for pensions in the event of permanent total disability.

The acceptance of the provisions of the Compensation Law of various states in which the employer has the privilege of choice, seems to be advisable, as it appears to be a fair and equitable means of settlement. The employee knows exactly what the law provides for him, and cases in dispute are comparatively few.

Wherever any dispute arises, both the employer and employee have the privilege of submitting the case to an Industrial Accident Board, such a body being provided by each of the states in which the Compensation Law is in effect, and to which litigants may appeal without any outlay for its services.

Another advantage, of course, is that Court proceedings are unnecessary. The benefit of this feature in the law is obvious, eliminating considerable loss of time usually entailed in trial proceedings, and precluding the frequently expensive services of attorneys.

Insurance for Liability in Other States

Employers Liability Insurance is written to relieve the employer of loss for accidental injury to employees in states in which Compensation Laws do not exist. This form of coverage is available under contracts of insurance stipulating certain limits of liability beyond which the insurance company is not liable. The limits under this form are generally as follows: $5,000 for one person injured, and subject to that limit for each person, the company's liability on account of any one accident injuring more than one person is limited to $10,000. However, higher limits can be provided for a small increase in premium. These higher limits should be carried on most classes of building construction.

Compensation and Employers Liability Insurance contracts are generally written to cover all of the contractor's operations wherever undertaken, the period of coverage being one year.

"Rates per $100 of wages" is the basis of premium charge, the pay roll being the only fair means of measuring the cost for the hazard involved. An estimate of payroll is used as the basis for computing the advance premiums. The actual premium is ascertained by audit of the payrolls at expiration of the policy term, the earned premium for the year being the amount derived by the application of rate to the actual payrolls.

Frequently where payrolls are large, involving a premium upward of $1,000 per annum, a twenty per cent deposit is paid in advance and a quarterly or monthly audit and premium settlement is arranged, a deposit being carried over by the Insurance Company to apply on the last audited period under the contract. This method of premium payment is effective on all forms of Compensation and Employers Liability Contracts of Insurance.

Public Liability Insurance

Public Liability insurance is of equal importance to that insurance covering those in the employ of the contractor. Accidents may occur within, adjacent to, and in the vicinity of buildings in the course of construction, to persons having no interest in the operations conducted by the contractor. While such accidents occur with less frequency than do accidents to workmen, they are usually costly, and decidedly more difficult to adjust. Claims are made and suits instituted which are very often purely the fabric of unprincipled persons and unscrupulous lawyers. Those of the legal profession known as "ambulance chasers" no longer pursue the injured workmen in an endeavor to make out a case for him, as the administration of the Compensation Law obviates such procedure. This result is that the shyster lawyer has doubled his efforts in prosecuting claims for injuries to the public.

Careful handling by experienced adjusters is absolutely necessary in disposing of claims of this character. Most of the leading insurance companies are well-equipped to cope with such situations and the up-to-date business-like contractor carries a policy of Public Liability Insurance together with an Employers Form so that accidents from either source can be reported to the Insurance Claim Division and the contractor relieved of all anxiety and perhaps some business embarassment.

This form of insurance is written under contracts bearing limits of $5,000 for one person injured, $10,000 for one accident, effective in the same manner as previously outlined under the Employers Liability Form. A great many of the contractors today are carrying higher limits, usually $10,000 and $20,000, and very often $10,000 and $50,000, where the work engaged in seems to warrant more coverage.

Public Liability Insurance which also is based on payrolls and subject to audit, is less costly than the two other forms of coverage, the rate usually ranging from fifteen to twenty-five per cent of the rates charged under the employers liability policy.

This insurance demands the selection of an insurance company of the highest grade, as some of these public cases are in process of ligitation for years. Then also there are cases which if poorly handled might permit of a claim going beyond the Company's limit of liability, the excess, of course, falling upon the insured.

Qualifications of an Insurance Company

In selecting an insurance company it should be remembered that the legal liability of an employer rests

with him and that this contract of insurance is purely and simply his own personal arrangement, and that failure on the part of the insurance company in nowise relieves him. Therefore, the insurance company should be chosen with particular care.

The insurance company must be equipped with a claim department capable of rendering prompt and efficient service. This is necessary because under the laws of various states there are rules and regulations imposing penalties and fines for non-compliance with such requirements.

The experience which an insurance company has had is very important, because much depends upon the intelligent handling of all matters regarding relationship between employer and employee. Loose and slip-shod methods cause untold injury.

Last, but decidedly not least in importance, the contractor should designate an agency or office of good repute, whose experience in this line makes it possible to know what the contractor's insurance requirements may be. Such person or office should be constituted by the contractor as his personal representative, to procure for him policies of insurance which will provide full and adequate coverage, and to serve the best interests of the contractor at all times.

A Final Word

The best insurance is the cheapest in the long run.

Co-operation at all times for the reduction of accidents is important, for upon renewal of the insurance, the insured's experience is a factor in the application of rate.

Lime Facilitates Chuting of Concrete

Mr. Leonard C. Wason, president of the Aberthaw Construction Company, of Boston, Mass., in an article appearing in the March issue of Concrete discusses the difficulties encountered in chuting concrete on large structures or where local conditions require the chutes to be any considerable length.

He points out the fact that in ordinary practice it is necessary to construct chutes with a drop of 3 or even 4 feet in every 10, and that even with this slope it is often necessary to add excessive amounts of water to the concrete in order to lubricate the mixture—this excess water being a decided detriment to the ultimate strength of the concrete. He further points out that under such conditions it is often advisable to provide auxiliary hoppers at the lower end of each section of the chute in order to re-mix the concrete and so overcome the segregation which otherwise takes place because of the presence of this excess water.

The National Lime Association wishes to remind all engineers and contractors of the fact that various references covering the above points are made in the bulletins issued by their construction department. These references clearly bring out the fact that the judicious use of hydrated lime will go far toward eliminating these objectionable features—reducing the expense involved in the construction of extremely high towers and remixing hoppers, besides promoting workability in the forms.

A notable instance is the construction of the Filtration Plant at St. Louis, Mo., with the addition of hydrated lime to the concrete. Chutes 400 feet long were used having a drop of only 2 feet in every. 10. No trouble was experienced in handling this concrete and little working was required in order to produce a satisfactory water-tight job.

Many other instances of a similar nature are set forth in the various publications of the construction department of the National Lime Association, Washington, D. C., and many valuable data are given regarding the benefits already secured by those who have used lime in their concrete construction.

"Hendricks' Commercial Register of the United States" for Buyers and Sellers

Twenty-ninth Edition
S. E. Hendricks Co., Inc., New York
$12.50

Like an old friend in a new dress the new 1921 edition of Hendricks' Commercial Register came to us this year in a bright attractive shade of red with black lettering and at once drew our attention. A study of the book revealed that the publishers had maintained the high standard of this book for the past 29 years, have retained all of its good features, and have added some new ones. One of the striking features of the book is its simple method of arrangement and complete index making it the most easily used book of its kind we have seen, a feature which should appeal at once to the busy man. This ease of use is further increased by the exterior index a feature added last year and continued in the new edition. An examination of the lists relating to the industries in which we are particularly interested showed them to be complete, accurate and up-to-date.

The book contains many advertisements which in no way obscure the lists, but in fact give the user much additional and valuable information.

The publishers have added a page of directions entitled "How to Find Information," which gives in concise form detailed instructions as to the best way to find desired information. From this we note that the book is divided into five sections, the "Index to Trades," "Classified Trades," "Trade Names," "Alphabetical," and "Advertisers Index." The purpose and use of each is fully explained.

Another addition this year is a sheet of perforated post cards on which users of the book are urged to report faulty listings, wrong classifications and concerns which may have been omitted. They say "Although 'every effort is made to thoroughly revise 'Hendricks' Commercial Register' every year it is inevitable in a work of this size that errors or omissions creep in. The publishers will appreciate information as to new firms which should be listed, or ones which should be eliminated, changes of address, etc."

On the whole the new volume seems to us most complete and we believe the use of such a book almost indispensable in any well organized purchasing or sales department.

In the great reorganization of business following the war so many changes have taken place and are still going on that only by means of such a book, can a business house have readily available all concerns which now manufacture any article it may require or which are possible users of its product. Our experience has shown that many former sources of supply are no longer available while many new ones have arisen, and the same is true of outlets for the completed product.

To our readers who have used such a book in the past we recommend the new edition of "Hendricks' Commercial Register" and to those who have not heretofore used one we believe the purchase of this book will prove a profitable investment.

The Preparation of Sand and Gravel

The Washing and Sizing Process

Sand and gravel are usually washed during the process of sizing. The correct and essential principle in washing is to give the material sufficient agitation to reduce the lumps of mud and clay to such fineness that the water will carry away the particles in suspension, leaving only the sand and gravel. The agitation should also be sufficient to scour the sand and gravel, washing them so thoroughly that they cannot retain any film of dirt to prevent bonding properly with cement in concrete work.

In sizing, the best method is to take out the largest sizes or grades first, because highest screening efficiency is obtained in this way. The greatest quantity of material is handled by the screen making the first separation and naturally the easiest and most effective screening result is attained by having the first screen with large holes, to pass readily all but the largest sizes. Then with the successive removal of the smaller sizes, the quantity of material to be handled is continuously reduced as the work approaches the screening of greatest difficulty—the separation of the finer sizes.

In addition to the superior screening efficiency by progression from large to small in the separation of sizes there is the mechanical advantage of greater durability and longer life for the screens, because the greater mass of material is handled by the heavier screens, whereas the reverse process throws the most destructive work on the fine screens, which naturally are least able to endure it.

Here are two good and all-sufficient reasons why no screening system which works from fine to coarse should be considered by one who would have his plant both efficient in operation and economical in maintenance.

An individual screen for each size or grade of product is also essential, that the whole volume of water may be utilized in each screen as each size is taken out, thereby giving best results in washing and highest effectiveness to the water supplied.

Some materials carrying large amounts of clay, loam or molding sand, cannot be reduced properly in the first sizing screen, so they must be subjected to a preliminary agitation and washing, to break them up and scour them before they reach the screens.

After the material passes through the sizing screens, the sand still remains with the soil water, from which it is separated by a sand separating tank. This device automatically draws the sand from the bottom and allows the soil water to flow continuously out of spillway at the top. When the ordinary "settling box" is used, allowing the water to percolate down through the sand instead of being drawn off above, the sand will retain all of the impurities of the water, just as in the action of a filter bed.

The screens are usually mounted over bins, from which the graded material is drawn into cars or wagon for shipment. Stones in sizes too large for commercial uses are usually put through crushers and screened

The number of screens used is governed by the number of sizes of material desired. In some cases the screens are mounted on skeleton framework or tipples, and the material drops directly into cars under the tipple. In the operation of such a plant a car must be provided for each size, and there must be a track for each size made.

Plants have been built with the screens mounted on dredges, from which the different sizes of material are spouted direct to scows; also portable plants, mounted on flat cars, truck wheels or rollers.

The material is delivered to the top of the plant by various means, such as belt conveyors, bucket elevators, drag-line excavators, skips and dredge pumps. It is impossible successfully to apply the same method of handling to all cases, and local conditions govern what should be used for the purpose.

The bins can be made to hold from a few carloads to fifteen or twenty carloads. They can be built of wood, steel or concrete.

The Link Belt Company, Chicago and Philadelphia, are prepared to design and furnish equipments to meet these conditions.

Sand and Gravel Pump of Improved Design

The Kansas City Hay Press & Tractor Co., Kansas City, Mo., has developed the "Lightning" centrifugal type of pump for use in sand and gravel work which fills a long-felt need. Construction work of today requires increasing qualities of clean, sharp sand and gravel, and with this comes demand for the equipment which will produce these commodities most economically. The centrifugal pump has become the standard machine for gathering sand and gravel from lake and river beds—the chief sources of supply.

Sand and gravel are so abrasive in character that parts for pumps made of ordinary cast iron or steel are readily worn out. Economy demands a metal in the pump which will resist this abrasive wear. Years of experience in comparative tests with pump shells, runners, side plates and hubs manufactured of various metals has proved that the "Special" steel castings perfected for Lightning pumps are the best suited for the severe conditions that are met with in sand and gravel pumping. When this fact was established the next step was to design a pump that would produce these products at the lowest cost.

The engineering department of this company cooperated with users of sand and gravel centrifugal pumps, and by close study of conditions and difficulties encountered in actual work developed the practical "Lightning" sand and gravel pump. This pump was designed to give the greatest mechanical efficiency possible. The simplicity of the model combined with its sturdiness has reduced the maintenance cost to a minimum.

The "Lightning" is easy to adjust and easy to replace parts. The drum and plates are removable and adjustable to any position.

Full details of the "Lightning" sand and gravel pumps may be obtained by writing the Kansas City Hay Press & Tractor Co., Kansas City, Mo., and mention Cement & Engineering News.

Concreting in Cold Weather

How to Secure Safe and Satisfactory Results During Winter Months.

EDITORIAL NOTE: *In many classes of concrete construction, work may be carried on through freezing weather if a few necessary precautions are observed. Without attention to these details, however, results are almost sure to be unsatisfactory.*

In the article below cold weather concreting methods are briefly outlined in a condensed form as a basis for application to each particular job.

Two results are to be sought for in cold weather concreting; first, preventing the concrete from freezing and second, allowing the concrete to harden in the normal time.

The most important point to bear in mind is that concrete must not be allowed to freeze. It is apparent that when concrete freezes the mixing water is turned to ice and this immediately stops the setting action of the cement. At the same time the formation of ice crystals within the partly set concrete disrupts the particles and makes the concrete weak or entirely worthless.

Preventing Freezing

The old way of preventing freezing was to add salt to the mixing water. This is no longer considered good practice. It only lowers the freezing point a few degrees and at the same time causes corrosion of reinforcing steel. Also the addition of salt does not hasten the hardening of the concrete, which is a slow process if the concrete is very low in temperature.

The best practice of today is summed up as follows: Have the concrete warm when it is deposited in place and keep it warm until the cement has set. In other words, heat the mixing water, the sand and the stone before mixing so that the concrete will be warm as it comes from the mixer. Then protect with canvas, tarpaulins or other means (if necessary supplying artificial heat by stoves) until the concrete has set up and thoroughly hardened.

To Heat Materials

Mixing Water is heated by a steam coil in the water barrel or tank. A steam mixing valve is sometimes used whereby the water is heated by a jet of live steam as it enters the mixer drum. For small jobs the mixing water flows through a coil of pipe located in an open wood fire, or a fire may be built directly under a large tank or caudron holding the water.

Sand is heated by exhaust steam from pipes thrust into the pile. Another method frequently used is to build a fire in an old smoke stack or sheet metal culvert pipe and pile the sand over and around the pipe. Sand and stone or pebbles need especial attention in heating because they often contain frozen lumps and even frost, snow and ice.

Stone is heated in the same general way as sand, except that stone piles are often covered with canvas or tarpaulin to prevent too rapid escape of heat and steam.

Cement need not be heated.

Protect Concrete After Placing

Buildings should be enclosed with canvas or tarpaulin, the interior heated by means of salamanders (sheet-metal open stoves). Heavy mass foundations and similar work where the volume of concrete is large may be protected by covering with building paper or canvas and a thick layer of straw.

Sidewalks, drives and outdoor floors have a large exposed area and are liable to be affected by frost coming out of the ground. Therefore, this class of work should not be undertaken in freezing weather unless under emergency and when extraordinary protective measures are taken.

Avoid "Frostproofers" and Like Nostrums

From time to time various substances are placed on the market for "frostproofing" concrete or hastening its setting. The best advice is not to use such "remedies" but to rely on the simple methods described above. Such materials are usually well known substances sold at a fancy price. For example one frostproofing compound was found upon analyzing to consist almost entirely of common salt—but sold at high price. Even disregarding the added cost, substances such as salt and calcium chloride may promote corrosion of reinforcing steel and thus be very harmful.

Caution in Removing Forms

Even after carefully heating materials and protecting concrete, forms and supports should not be removed too soon. Under ideal conditions the concrete could not gain strength as quickly as in the heat of summer. Frozen concrete is sometimes mistaken for concrete that has properly hardened. A test for this is to play a gasoline blow torch upon the concrete, or immerse a piece of it in hot water. If the concrete softens it is proof that it is frozen and not hardened.

Handbook on Concrete Construction

Atlas Handbook on Concrete Construction, by Atlas Portland Cement Co., 30 Broad street, New York City, with branch offices in principal cities. Price $2. To readers of "Contractor's Atlas" a copy of the book will be sent without charge, providing request is made on letter-head or name and address supplied exactly as it appears on the "Contractor's Atlas" received monthly by the applicant.

This book, which is written especially for contractors and builders, has been planned by the Atlas Portland Cement Co. to meet a need for a handbook or reference book covering the field of concrete construction in a brief, concise and practical way. Bound in durable cloth cover, and of convenient size to slip readily into the pocket, it will serve as a constant companion for the man "out on the job." Its 144 pages are profusely illustrated and contain many tables.

In this work special attention has been given to the subjects of handling steel reinforcement, the building of forms and the layout of mixer plant, hoists and similar practical details. The following condensed table of contents gives an idea of the subjects treated:

CHAPTER I.

Concrete: Selection of Materials—Proportioning—Slump Test—Quantities—Handling Sand and Stone—Mixing and Placing—Water-tight Concrete—Concreting in Cold Weather—Concreting Under Water—Surfacing Finishes.

CHAPTER II.

Reinforced Concrete: Columns—Steel for Reinforcement—Bending Steel—Placing Steel.

CHAPTER III.

Forms for Concrete.

CHAPTER IV.

Construction: Reinforced Concrete Building Construction, Including Footings, Floors, Columns, Roofs, Walls, etc.—Elevators—Swimming Pools—Culverts—Retaining Walls, etc.

CHAPTER V.

Miscellaneous: Estimating—Portland Cement, etc.

Some of the Engineering Accomplishments of the Westinghouse Electric & Manufacturing Company for 1920

By W. H. Cope*

The most notable engineering achievements of the Westinghouse Electric & Manufacturing Company for the past year have probably been in connection with business obtained from many of the most important customers, because of the great business activity through which we have passed. Bigger problems have arisen in ever increasing numbers. Super-power stations are being designed for ultimate capacities of 300,000 kw. in order that our diminishing supply of coal may be utilized economically, and for the elimination of uncertain and expensive coal transportation. In this trend toward large stations, the Westinghouse Electric & Manufacturing Company has played a very important part. Steam turbines of greater than 25,000 kw. have been ordered this year to the extent of nearly one-half million kilowatts. Notable among these orders are the Colfax station of the Chestwick Power Company a subsidiary of the Duquesne Light Company, and the Hellgate Plant of the United Electric Light and Power Company of New York, N. Y., the former being located at the coal mine and the latter at tidewater. At the Colfax station the first 60,000 kw. unit was placed in operation on December 18. This is the second 60 cycle, triple-element turbine-generating unit of this size which has been placed in operation. Additional units have also been ordered by companies such as the Commonwealth Edison Company, Naragansett (R. I.) Electric Light Company, United Electric Company of Springfield, Mass., Virginia Power Company.

In the hydro-electric field the Westinghouse 32,500 kv-a., 25 cycle, 150 rpm., vertical water-wheel generator was placed in operation. This is one of three units at Niagara Falls which are the largest in the world.

Other apparatus besides water and steam turbines have naturally followed the development towards larger units. At the Colfax plant Westinghouse has installed the largest single-phase oil-insulated water-cooled transformer that has ever been built. It has a rating of 23,600 kv-a., 60 cycle, 12,000-132,000 volts. There has been designed and is now being constructed in the shop, transformers operating at the highest commercial voltage adopted for the transmission of power. This order covers seven 16,667 kv-a., single-phase, 60 cycle, 12,000-220,000 volt oil-insulated water-cooled transformers for the Pacific Gas & Electric Company.

For the Hellgate Station of the United Electric Light & Power Company, New York, an order was received during the year for oil circuit breaker equipment, which is said to be the largest single order ever placed for circuit breakers. They include capacities higher than have ever been built. The layout of this equipment involves special features of design differing radically from previous practice in switchboard construction. The fundamental idea involves segregation of the phases in a type of construction that will prevent the possibility of phase to phase short circuits in bus-bar structure.

At the Philadelphia Electric Company, there has been installed two 1,750 induction-type regulators, which are the largest capacity of induction regulator yet built. They are installed in the low-tension side of the transformers supplying the two 66,000 volt tie-lines between the Schuylkill and Chester generating stations which service demanded the maximum of reliability. Induction-type regulators of Westinghouse manufacture were selected by the operating company after careful analysis of synchronous boosters and step induction regulators.

In the automatic voltage-regulator field, there has been developed a face-plate type of regulator for service corresponding to that previously filled by the vibrating relay type of regulator. The first commercial installation of this type of regulating equipment is being installed at the Colfax plant of the Cheswick Power Company for controlling the 60,000 kw. turbine-generating units.

In the railway field, two of the outstanding demonstrations of Westinghouse engineering consist in the continual proof in actual service of the wonderful performance of the alternating current substations on the Norfolk and Western, Pennsylvania, and New Haven Railroads, which have added one more year's achievement to their past records. In addition, the initial installation of Westinghouse 3,000 volt direct current locomotives and substations on the Chicago, Milwaukee & St. Paul Railway is demonstrating each day that through analysis of the requirements and designs produces electrical equipment that is well-igh perfect. Some mechanical defects developed on these locomotives, but measures for correction under way will without doubt, eliminate these faults.

The Westinghouse Electric & Manufacturing Company has been very active along marine lines during the entire year. Its first electrically-propelled battleship, the Tennessee, went into commission this year, and has had preliminary sea trials. The electrical equipment for the battleships Washington and Idaho, sister ships of the Tennessee, has been shipped and is now being installed.

*Assistant Director of Engineering, Westinghouse Co.

The Right Refractory in the Right Place

It is not enough to look only for quality in the fire brick and other fire clay refractories you buy. A good fire brick will not last long in the wrong furnace.

A refractory manufacturer's real value to you lies in his ability to recommend the one brand best suited to your particular practice. To do this he must have more than a thorough knowledge of his own business; he must have just as thorough a knowledge of yours.

Crescent Refractories Co., Curwensville, Pa., not only make good refractories, but they know the actual working conditions to which those refractories will be subjected in the cement and lime industries. This knowledge is based upon endless study and investigation—upon the extensive activities of a well-equipped research laboratory—upon reliable data that have been proven to be scientifically correct.

So whenever a representative of Crescent Refractories Co., calls upon you, bid him welcome. Regardless of whether you buy anything or not, his knowledge and experience are yours to profit by. And when he does sell you Crescent refractories, you will soon realize that their uniformly-high quality and perfect suitability to the work in which they are used, makes them the most economical refractories you have ever used.

News of the Cement Mills

The Dewey Portland Cement Co., Dewey, Okla., are giving their plant a complete overhauling in every department. Mr. F. E. Tyler, president and general manager advises us they are at present in the midst of making very extensive improvements which, when completed, will cost approximately $800,000. They are installing a Waste Heat Boiler plant of 4,500 H. P. capacity consisting of two 2,250 H. P. Edge Moor boilers, service condenser, pumps, evaporators, water lines, sprays, 3,300 K. W. General Electric Turbine with complete accessories thereto such as switchboard, lines, etc., and expect to have the above equipment with many other smaller items ready to operate about April 1st next.

They are also installing a complete apparatus covering drags, storage for clinker, traveling crane for handling same and many other smaller items.

As a result of the above they do not expect to increase their capacity materially over what it has been in the past except that they have had insufficient power and this will give them ample power hence will be in position to make approximately 100,000 barrels of cement per month.

P. A. Sandt, who for some time has been in the employ of the Marquette Cement Company as a chemist, has resigned to accept a position as traveling salesman for the W. P. Drackett Sons & Co., chemical manufacturers, Cincinnati, O.

The following directors of the Alpha Portland Cement Company were elected at the annual meeting of that corporation, held at Jersey City:

James H. Lockart and J. M. Lockart,of Pittsburgh; Louis H. Porter, of New York City; G. S. Brown and Frank G. McKelvy, of Easton; F. M. Coogan, of Phillipsburg; C. K. Boettcher, of Denver; C. H. MacNider, of Mason City, Ia., and C. A. Irvin, of Chicago.

The directors organized by electing G. S. Brown, president; Frank G. McKelvy, F. M. Coogan and C. A. Irvin, vice presidents; John J. Matthes, of Phillipsburg, treasurer; F. G. Lyons, of Easton, assistant treasurer; R. S. Gerstell, of Easton, secretary; W. E. Viets, of Chicago, assistant secretary and treasurer.

Encouraging reports regarding the business of the past year of the Marquette Cement Company, La Salle, Ill., were made at the meeting of the stockholders of the company recently held.

The report of Superintendent Moyle regarding improvements and other features was particularly pleasing to the stockholders and showed that the Marquette is in a thriving condition, with prospects of even a better career in the future.

The following officers were elected:

President, Theodore Dickenson; vice-president, William Dickenson; chairman, N. W. Duncan; treasurer, Charles Hanley; Secretary, Walter Wacker.

Bonuses totaling $14,000 have just been paid to the 150 employes of the Newaygo Portland Cement Co., based on the company's system which allows each employe the same dividend on his year's earnings as is paid the holders of common stock. The plant now is closed for the annual winter overhaul of machinery after completing the biggest year's run in its history.

The South Dakota senate has made provision for the construction of the state cement plant, which will be located at Rapid City, when it passed a bill appropriating $2,000,000. The funds will be obtained by the state through the issuance of bonds at 6 per cent. The bill was sent to the house.

A new use for the motorcycle was recently originated by the Lehigh Portland Cement Company, who have under construction a large flume at Metaline Falls, Wash. The motorcycle, which has a special chassis adjustment, draws a trailer bearing 200 feet of lumber from a sawmill at the head of the flume to the end of construction at the other extremity, a distance of 2½ miles. Twelve loads of lumber are transported each day, or a total distance of 60 miles for the round trip.

Superintendent Herbert Helwig is quoted as saying that the motorcycle, which is a stock machine, does the work formerly performed by four men and that it paid for itself four or five times in the first month of operation.

Directors and officers for 1921 were elected by the Wolverine Portland Cement Company at their annual meeting here. Represented in the meeting were stockholders whose shares total 58,000. The following directors were elected:

F. M. Rudd, Bronson; L. M. Wing, A. E. Robinson, C. C. Jones, J. B. Branch, E. D. Legg and R. H. Flandermeyer, of Coldwater. Immediately after the stockholders' meeting the directors met and elected the following officers: C. C. Jones, president and manager; A. E. Robinson, vice-president; R. H. Sweeney, secretary and treasurer; Miss F. E. Root, assistant secretary and treasurer.

The plants of the Lehigh Portland Cement Co., at Mason City, Ia., Iola, Kan., and Oglesby, Ill., which were closed down for repairs, have started up again.

Sixty thousand dollars will have to be paid to the Peerless Portland Cement Company of Union City as refund on freight overcharges, if the interstate commerce commission upholds the decision of their special examiner, F. H. Barclay, in the case of the cement company against the Michigan Central railroad and the U. S. Railroad Administration.

The case involved a question of freight rates on cars of wet marl hauled from Spring Arbor to the company's plant at Union City, a distance of 32 miles. Complaint was filed with the interstate commerce commission January 20, 1920, and covered a period extended from June 25, 1918.

Suit in circuit court of the Michigan Central railroad against the cement company for collection of about $24,000 freight charges, which the cement company refused to pay, hinges on the final decision of the interstate commerce commission.

The cement company has been paying $15 a car for the haul from Spring Arbor to its plant, and its contention was that the proper rate would be $7.50 a car, which contention has been upheld by Mr. Barclay of the commission, who further recommends that the railroad administration and the railroad company pay the company $60,000, which includes the $24,000 for

which the railroad company brought suit. The charge of $7.50 a car is held to be the proper rate for the future.

Four hundred employes of the Atlas Portland Cement Company, Northampton, Pa., who were laid off early in January were notified to report for work this week.

Paul E. Bellam, member of the state cement commission of South Dakota, recently appeared before the house committee of the Missouri state senate appointed to investigate the feasibility of a state-owned cement plant and gave testimony and figures relative to the construction of such a plant. Chairman John C. Dyott of the investigation committee state that Mr. Bellam had given the committee information which, through investigation, would have cost thousands of dollars. There were several estimates furnished by Mr. Bellam which were not made public, but which were given to the committee. Chairman Dyott said these were the property of the state, and as long as the Missouri committee was furnished this data, out of respect to the South Dakota commission, they should be held as private.

Practically everything is ready to begin construction on the South Dakota plant, the legislature having authorized the issuance of $1,000,000 for that purpose. However, it is estimated in the commission's report that a 2,000-barrel capacity plant would cost $2,000,000.

That the state could manufacture cement at the maximum price of $1.36 a barrel, based on the August, 1920, prices, was the report of Mr. Bellam, and with the trend toward lower prices could within a short time reduce that to $1.10 a barrel.

He stated that in December, 1920, the time of the report of the commission, the price to the consumer in South Dakota was from $3 to $5 a barrel. It is thought, however, that a 2,000-barrel plant could be constructed for considerably less by the time the state would be ready to build, because of the trend to lower prices for the machinery.

Chairman Dyott said the cement manufacturers of the state would be invited to be heard later.

The Atlas Portland Cement Company, which several years ago, purchased more than 1,000 acres of land in the vicinity of Tippecanoe City, Ohio, plans for immediate work on the site, according to press reports.

The company is now engaged in plans for the removal of its mechanical plant at Hannibal, Mo., and is preparing to manufacture cement on a large scale.

The Dayton Power and Light Company has been contracted with to furnish the power for the industry. The proximity of the Dayton Power and Light Company, affording such attractive power facilities, it is said, was one of the prime considerations which entered into the proposed early operation of the Tippecanoe City industry.

It is reported a plant for manufacturing Portland cement is being erected at Redwood City, Calif. Laying of the foundations is proceeding and will soon be ready for the first buildings.

The Three Forks Portland Cement Co., Trident, Mont., want to engage the services of an experienced quarry foreman.

A merger o fthe Alpha Portland Cement Co. and the Cement Securities Co. has been announced. The new company, known as the Alpha Cement Co., will be a $30,000,000 concern. Charles Boettcher of Denver, president of the Cement Securities Co., becomes chairman of the board of directors of the new company. G. S. Brown, president of the Alpha Portland Cement Co., will be president of the Alpha Cement Co.

The Cement Securities Co. has plants in Colorado, Montana, Wyoming, Nebraska and Utah. The plants of the Alpha Portland Cement Co. are located in Pennsylvania, New York, West Virginia, Michigan, Illinois, Ohio and New Jersey. According to the announcement, the western headquarters of the new company will be in Denver, the eastern headquarters will remain in Pennsylvania and probably an office will be established in Chicago.

The new company will be a holding concern for the stocks of the two existing companies and will be capitalized at 300,000 shares of 7 per cent preferred stock of a par value of $100, and 600,000 of common stock of no par value.

Of the preferred stock of the new company $2,300,000 will be changed for the present $2,000,000 par value of preferred stock of the Alpha Portland Cement Co., $8,320,000 will be exchanged for $15,800,000 Alpha Portland Cement Co. common stock and $8.850,000 will be given in exchange for Cement Securities stock, including the 10 per cent stock dividend recently declared.

Waste heat will be transferred into power at the Northwestern States Portland cement plant when a $500,000 waste heat boiler, which is nearing completion, is fully installed. Seventy-five men have worked on the boiler for the past year. It will utilize heat from cement kilns and do away with much dust and coal smoke. The boiler works in conjunction with a suction vacuum which takes gases and carbons into it for heat transference. Edge Moor Iron Co. furnished the boiler.

The Oklahoma Portland Cement Co., Ada, Okla., have recently installed an additional 10 ft. x 240 ft. kiln and two 7 ft. x 26 ft. Allis-Chalmers compeb mills, which increases the total capacity of their two plants at Ada to 5,000 barrels per day.

Giant Portland Cement Co., Philadelphia, earnings for the year ended Dec. 31, 1920, gross receipts were $2,805,943, increase $795,456; net after taxes, $312,516; decrease $147,149; surplus after charges and depreciation, $146,013, decrease $127,112.

The Ash Grove Lime & Portland Cement Co. advise they have no immediate plans for increasing their capacity at this time.

The Atlas Portland Cement Co. has announced that its plant at Hannibal, Mo., which closed down about eight weeks ago, has started operating with a reduced production. A wage scale averaging about 25 per cent reduction was also announced.

A reduction of 50 cents a barrel in the price of cement was announced yesterday by the Great Western Portland Cement Co. The new price is to take effect immediately, and will make possible the sale of cement in carload lots at $2.60 a barrel to the retailer. O. F. Swanson, general manager of the company, in carload lots at $2.60 per barrel to the retailer. O. F. Swanson, general manager of the company, in

speaking of the decline, said it was made necessary by a competitive Eastern market, which is quoting lower prices. The reduction was not brought about by a decrease in costs of labor or materials, Mr. Swanson said.

At the annual meeting of the stockholders of the Bath Portland Cement Co. the following directors and officers were elected: President, Louis Rafetto, Philadelphia; first vice president, Fred B. Franks, Bath; second vice president, Walter G. Dutton, Philadelphia; treasurer, John Barnes, Philadelphia, and Herbert C. Rafetto. The company had a prosperous year. The mill near Bath is in full operation at present, having been closed down only a week after January 1 for necessary repairs.

At the annual meeting of the Penn Allen Cement Co. the following directors were elected: William E. Erdell, Benedict Nuding, Mrs. William R. Yeagar, E. A. Wolfe and H. E. Hess. The officers chosen are: President, William E. Erdell; vice president, E. A. Wolfe; treasurer, H. E. Hess; secretary, T. V. Bretherton, Philadelphia. The company is in a sound and flourishing condition, and President Erdell stated that after temporary dullness during the winter season the cement outlook is picking up.

Electric hazards are always more or less numerous around any industrial plant. Until recent years the average cement plant overlooked altogether the dangers to the employes from unsafe electrical equipment. Poor switches and motor starting apparatus, bad insulation, fuses, poor safeguards, inexperience, and carelessness contribute to the dangers from electrical equipment, writes G. Diedrich, chief electrician, Missouri Portland Cement Co.

All switches should be of an enclosed type approved by the underwriters, and the starting apparatus should be especially adapted for the cement plant, of few working parts and accessible to regular inspections. Fuses enclosed in cartridges should be used and located in the line wherever possible to give relief from any excessive strain due to overload or excessive "short." Wire insulation should be good and all wires should be strung on insulated supports clear of any buildings or trees and the like. High tension lines, lightning arresters, busses and the like should be guarded from the inquisitive by fencing with a locked doorway. Transformers, motor frames, switch-boxes, starter boxes, conduit, metal railings, frames at panels and the like should be grounded. With the best of safety guards, the inexperienced should not "monkey with the juice."

Fewer accidents are likely to happen in the power house or in the substation than in any other departments of a cement plant. As a rule, this part of the equipment is good; put up in a convenient, workmanlike manner, and, the percentage of employes at this department is small.

News of the Gravel and Crushed Stone Plants

The Valley Sand Gravel Company, of Rochester, N. Y., has preferred charges before the Public Service Commission at Rochester, N. Y., that the Pennsylvania Railroad Company refused to establish commodity rates for sand, stone and gravel from Canawangus to various points and that the railroad company further refused to transfer complainant's shipments to the Lehigh Valley Railroad at Wadsworth, N. Y. The Commission ordered the railroad company to fix rates.

The Silica Sand Co., Mount Holly Springs, Pa., recently fired a blast that loosened an estimated amount of 15,000 tons of sand for working. Three tons of dynamite were placed in seven holes, each about 65 feet in depth, driven by Sanderson Cyclone drills.

The Medford Washed Sand & Gravel Co., Medford, Minn., have their modern equipped plant in successful operation and they report business very good. They operate a crusher made by the Universal Crusher Co. of Cedar Rapids and a Sauerman Dragline cableway excavator.

G. H. Davis, who operates a quarry and crushing plant at Blue Springs, Nebr., advises us that piece work is the only system by which he can make any profit at all. He operates a No. 5 Austin and a No. 3 Gates gyratory crusher and two revolving screens.

Geo. M. Johnson Limestone Co., Hillsville, Pa., are large producers of both fluxing stone and agricultural limestone. Their dust mill adjoins the crushing plant and is equipped with machinery for fine grinding which is seldom met with in other parts of the country at the present time. The pulverizing equipment consists of a combined ball and tube mill (Compeb Mill) such as is commonly used for grinding in the Portland cement industry.

This mill has an output of 10 tons per hour and grinds to a degree of fineness such that 90 per cent passes a 100-mesh sieve. The practice of all the Eastern limestone producers is toward finer grinding than is now done in the Central West.

The other equipment of the dust mill consists of a large roll crusher, 5x50-ft. rotary dryer and a quadruple bagging machine, with the usual elevating and conveying machinery. Shipments are made in both bulk by box car and in 80-lb. bags.

Waukesha Washed Sand & Gravel Co., 204 Grand Ave., Milwaukee, Wis., operate pits at Waukesha and Okanchee, Wis. Have two No. 5 crushers, 2 steam shovels and a Sauerman dragline bucket. Daily capacity, 2,000 tons.

Spalding County, Georgia., J. E. Wallace, chairman, has purchased an entire rock crushing outfit and about 50 acres of land within one mile of Griffin on which there is enough crushed granite to pave all the important roads in the country. They have employed as superintendent of this enterprise Mr. Randall, of Fulton county, who has had twenty years' experience in road building. He says he can turn out eighty cubic yards of crushed granite per day, at a cost of 3 cents per cubic yard. This crushed rock is of four different sizes when passed through the crusher and separated by a sieve.

Siems, Helmers & Schaffner, contractors, St. Paul, Minn., are building a new concrete road from Fairbault to Northfield and produce their own crushed rock near Fairbault and are operating a crusher there. The rock is taken to the crusher in small dump cars. The crushed stone is discharged into railroad cars for hauling to the proportioning plant, and the dust is carried away on conveying belts.

The city of Montrose, Colo., produce their own crushed stone, operating an Aurora jaw crusher.

Benton Avenue Stone & Crusher Co., Springfield, Mo., has leased its quarry and sold its machinery and equipment to the highway commissioners of the district. Fred Garrett, president of the Commission, states that the material will be utilized in biulding roads, especially the Springfield 8-mile road, which work has been delayed.

Tuohy Bros., contractors of St. Paul, have a contract in Arizona to construct 283 miles of concrete highways and have erected their own crushing plant at Tempe, Arizona.

H. D. Conkey & Co., Mendota, Ill., are manufacturing a new and very efficient steel pit car that is fast becoming the popular car among sand and gravel producers because of its durability and moderate price.

The agricultural lime industry of Pennsylvania is probably more carefully encouraged by the State authorities than anywhere else. For the past four years a lime-requirement survey of soils has been in progress. There are two general classes of soils in the state, one needing from 5,000 to 6,000 pounds of lime per acre and the other about 3,000 pounds.

Before lime products can be sold in Pennsylvania for agricultural purposes, the law requires each brand to be registered by an affidavit filed with the State Agricultural Department on or before January 1 of each year. It is also necessary to pay a license fee of $5 to $20 according to the number of tons sold the previous year.

The manufacturer is required to give with the product a guaranteed analysis for calcium oxide and its equivalent as calcium carbonate, magnesium oxide and its equivalent as magnesium carbonate and the degree of fineness, showing the number of sieve mesh through which the coarsest particles will pass.

It has been common practice for years to use dynamite for stripping top soil from iron ore beds, shallow coal deposits, stone quarries, etc., but it is unusual to blast the top soil from sand and gravel pits; yet the method is just as applicable to such work and saves as much time and labor in the one as the others.

A description of the method employed by the Washington Sand and Gravel Company at their works near Bladenburg, Maryland, may be of interest to other producers of these materials.

Their pits are located at the side of a creek or small river. The sand is loaded on boats by means of a floating suction dredge operated on the creek.

To get at the sand, it is necessary to strip off four to six feet of top. This stripping is now done by blasting with dynamite. A shot recently observed by the writer was loaded as follows:

Bore holes were put down vertically, four feet deep and located eight feet back from the creek bank. In this shot, there were seven charged holes, 2½ feet apart in the row.

Five cartridges of forty per cent ammonia dynamite 1⅛x8 was the charge in each hole. Each charge was primed with an electric blasting cap and the firing done with a blasting machine.

The shot removed the top from the section blasted, throwing most of the dirt into the creek.

It is figured that the cost of the blasting is more than balanced by the saving in the time and cost of operating the dredge to remove the top. This work was all waste, because no use could be made of the top soil.

The Traylor Engineering & Mfg. Company claims the distinction of having built and erected the largest stone crusher in the world, an enormous machine about 25 feet high from foundation to top. It weighs over 800,000 pounds and was completed in ninety working days, the erection requiring only fourteen days from freight car to breaking stone. This machine was installed at the largest limestone quarry in Michigan in order to eliminate labor in handling stone and thus cut down the amount of block holing and quarry work. It has a capacity for receiving rocks with dimensions of 5 feet in any direction, some of which weigh as much as 15 tons each. These are broken to 8 inch size at the rate of more than 40,000 tons per 20-hour day, which has been averaged since the machine was installed.

This machine is of the standard Bulldog gyratory type, and in order to limit the bearing pressure to safe amounts, it has an eccentric more than 8 feet long and 45 inches in diameter, with 9,900 square inches of bearing surface, fitted with a self-aligning journal bearing that absolutely prevents binding and reduces the friction.

It is lubricated by a fully submerged gear type pump which provides circulation for the continual bath of oil in which all the moving parts, including the cut steel gears, run. The main shaft is shorter and very much stronger than in other makes of gyratory crushers, resulting in a high percentage of power efficiency and smaller amount of power consumption per ton of material crushed.

The builders of the Bulldog gyratory crushers also manufacture a complete line of "Bulldog" jaw crushers, crushing rolls, revolving screens, rod, ball and tube mills, stone elevators and other quarry equipment.

The Bloomfield Washed Sand & Gravel Co., Bloomfield, Ind., has four storage bins built of concrete staves by the Concrete Silo Co. of Bloomfield, Ind., and built in the same manner that silos are built. These bins are 27½ ft. high by 24 ft. in diameter. They are located between switches from the two roads which serve our plant, viz., the Illinois Central and the Monon railroads, and they can load from either side into one or the other of the lines.

The bins are without bottom, other than the earth, and are filled with gravel up to the chutes, which are 14 ft. from the top of track. They found this to be the cheapest way they could build up that high. With 14 ft. of gravel in the bins the material will run out of the shutes into the cars. When filled to the top the bins will hold about four large carloads each, that is above the chutes. About three of these cars will run out when dryed without any assistance but the company usually divert a small stream of water into the bins when loading out to accelerate the flow.

News of the Concrete Products Factories

"You have in the hollow of your hand at the present time the chance to dominate the structural material market," said A. J. R. Curtis, of the Portland Cement Association, recently in addressing a Concrete Products Association meeting.

"You must be aware without very much thought that every last one of you who owns a concrete products plant can dominate the local market with which he is occupied, so far as quality and delivery are concerned. Competing products are finding it very difficult to make deliveries. Your delivery problems, while they may be difficult, are not nearly as difficult as the delivery problems of your competitors. Clay problems are constantly becoming more difficult, because of the increased cost of coal. That is an incidental cost in manufacturing your product. There is every reason why you should take heart and recognize the present as the time for you to expand, make better products and carry on a lively campaign."

A manufacturer of the Automatic Sealing Cement Burial Vault was asked what he though of the future of this business. His reply was an enthusiastic one.

"The future of the burial vault business is already here," he said.

This man went on to explain that his first year in business he sold seven vaults; the second year he sold about twelve times as many, while the third year showed another substantial increase, and the present year bids fair to carry him way beyond last year's mark.

This man gives it as his opinion that if the cement burial vault business does not thrive, there are just two men who are responsible, the two men who must work together to push this form of indestructible burial vault—the manufacturer and the undertaker.

In an effort to lower the cost of home building, the Rhode Island Concrete Products Association co-operating with the Portland Cement Association will hold a conference in Providence to instruct builders and prospective home owners, from all over the State, in the best and most economical uses of concrete.

At the present time one of the greatest factors of cost in building material is transportation. During the war, a heavy increase was added to rail rates on building material in order that rates might be so excessive that material would not move readily for construction work. That rate has never been equalized. The recent additional freight increase adds still more to the old transportation costs that must be considered in erecting a home.

Since 80 per cent of the material making up concrete is obtained locally, concrete is to some extent independent of the railroads for transportation. Sand and gravel are found in practically every locality, and by utilizing these local materials, the cost of building may be kept down proportionally, which is interesting, in view of the fact that the house shortage of the country has been placed at 5,000,000 by government officials.

As houses of concrete are practically non-combustible, great stress will be laid upon part of the program dealing with the advantages of concrete, as a fire-proof building material. The conference will also stress the desirability of impressive concrete block construction, showing how approved methods of manufacture will lower the cost of home building, and at the same time produce homes of great comfort and attractiveness.

Granette Products Co., Des Moines, Ia., operates a "Double-Speed" (Wood Bros.) block and brick machine and a Kent mixer. Use mica spar crystals for facing. Interested in vases, septic tanks and flower boxes molds.

The Fond du Lac Cement Products Co., John L. Fox, president; Joseph Wirth, vice president and general manager, Fond du Lac, Wis., recently organized, capital $25,000. The plant is located where Mr. Wirth conducted the business alone. All kinds of concrete products are manufactured but the company will specialize on drain tile. Production will be doubled and new curing rooms and warehouse will be built.

John T. McManus, Ackley, Iowa, operates a Farmer's drain tile machine and a Miller block and brick machine. Interested in mica spar crystals.

The Marshville Pressed Stone Co., Marshville, Wis., has been incorporated for $8,000 by Jacob Koll and W. G. Dobberpuhl to manufacture concrete blocks and brick.

Bertsch Bros., Richmond, Ind., recently installed a new automatic Besser power tamped block machine. They also operate a Dunn drawn tile machine and a Blystone mixer. On their envelopes in red ink appears the following slogan: "Build it with Concrete Blox from Bertsch Bros." They have erected a new building to house their heating plant and curing rooms.

Cement Products Co., New Bedford, Mass., has been incorporated by J. J. McGinty and John F. Abbott.

The National Concrete Materials Co., R. W. Miller secretary, Luverne, Minn., has purchased a site in Sioux Falls, S. D., and will establish its main office there. They contemplate establishing a concrete tile plant on a site 2½ miles west of that city.

The Core Joint Concrete Pipe Co., 1802 Whitmore Ave., Baltimore, Md., has been organized. They will manufacture reinforced pipe from 24 inches to 120 inches in diameter.

New Jersey Cement Products & Construction Co., Dover, N. J., has been incorporated for $100,000.

The Interlocking Cast Stone Co., Elizabeth, Pa., has been incorporated for $25,000 by J. Gotti, Ed. Pipkorn and M. Lennartz.

Saukville Concrete Products Co., Saukville, Wis., has been incorporated for $30,000 by Wm. M. Schmit and O. J. Grady.

Wm. M. Schmit, R. No. 2, Port Washington, Wis., is in the market for a drain tile machine.

The California Concrete Products Co., K. S. Mary-

inski, secretary-treasurer, are erecting a new plant at Evelyn and Bayview aves., Sunnydale, Calif., which will be equipped with the latest improved machines. J. Fred Holthouse, San Jose, Calif., is president.

Co-operation stimulates service.

The Picabbs Tile Co., Danville, Ind., has been organized with a capital of $100,000 to engage in the manufacture of cement building tile. The following officers are at the head of the new concern: Carl Rost, capitalist of Indianapolis, president; W. E. Carter, electrical engineer, of Avon, vice president; F. Brewer Hadley, Danville merchant, secretary, and H. C. Hadley, former Danville merchant and farmer, treasurer. The company owns a five-acre tract on the White River boulevard, and has under construction a new factory that will be the most modern cement products factory in Indiana. The project has the endorsement of the Indianapolis Building Association and also the Chamber of Commerce. E. G. Spink, the largest builder of apartment houses in the middle west, is one of the largest stockholders.

The Ramloe Stone Co., Albany, N. Y., is opening temporary quarters in Twoli street, Albany. The quarters will be used until a modern plant is built in the spring. The new company is incorporated for $50,000 and is headed by Frederick W. Siberkraus. Daniel Colmar, 411 Francis avenue, Schenectady, N. Y., is vice president and Stephen Colmar, secretary and treasurer. The capacity output of the plant will be about 30,000 building tiles a day. All the raw materials necessary for the manufacture of the company's products are close to the factory. The company has obtained control of large sand and gravel banks. When the new plant is in operation the corporation will be in a position to manufacture all kinds of artificial stone, garden furniture and brick. They have purchased a building tile machine from Federal Machine Products Co., 2775 East 23rd street, Cleveland.

George Harrower and Henry Michel, Fennimore. Wis., have bought the concrete products factory of Hy. Ransour, which contains a Victor block machine. Mankato silo molds and a Kent mixer. Interested in roofing tile, chimney blocks, burial vaults, vases, porches, flower boxes, waterproofing compound and facing materials.

John Brooking, 616 Broadway, Pekin, Ill., operates Wert block machine and tamper, Jaeger mixer and his own make burial vault molds. Uses white sand for facing blocks.

T. R. O'Brien, Box 444, Middletown, N. Y., operates Zoglemeyer molds and a Jaeger mixer.

The Prestone Products Corp., F. C. Keohne president, 6606 Greenfield avenue, Milwaukee, Wis., are now establishing a laboratory and small workshop. They have not purchased any machines as yet, but are in the market for a used Helm N. 5 hand combination machine for the laboratory immediately. Later in the season they will buy a drain tile machine, fence post, flower boxes, porches and vase molds, roofing tile and chimney blocks machines. Artificial marble and building trim will also be manufactured.

Farmers' Co-operative Silo Co., Geneva, Ind., operate an Ideal block machine, Dunn drain tile machine and a Blystone mixer.

No machine could operate any more simply than does the Kent Continuous Mixer. It is an improved piece of modern machinery and it does away with the cumbersome hoisting cars, charging platforms, chains, cables and whatnot found on many of the old-fashioned batch mixers.

The Kent in operation does its own measuring, mixing, wetting, wet mixing and discharging. Being a continuous mixer, the Kent once loaded up and started keeps turning out well mixed, well moistened material all the time. The old-fashioned batch mixers mix for one minute and then at least two minutes are used to measure cement and sand and load it up with another batch. While high priced workmen are doing this measuring and loading, the batch mixer stands idle. The Kent operates continuously and the batch mixer operates not over one-third of the time.

A Kent in your plant means more and better concrete for your block machine; it means less labor and it means more finished product. Write the Kent Machine Co., Kent, Ohio, for their catalogue, No. 8.

The Concrete Products Co., La Grange, Mo., R. E. Huntley, manager, has ordered machinery for manufacturing drain tiles.

A. L. Benshoof, Elliott, Ia., operates a Double-Speed (Wood Bros.) block machine, Little Giant hand brick machine, Dunn porch column molds, and a Bolte mixer. Is interested in waterproofing, up-to-date mixer, transfer cars and facing materials. Mr. Benshoof says he is going to branch out this season and may move to another city where the opportunities are better, as he declares he is capable of doing a much bigger business.

Penn & Co., Kaukauna, Wis., operate Ideal block machines. Is interested in burial vault, culverts, sewer pipe and septic tanks molds.

The power brick machines sold by the Besser Sales Co., 1312 20th street, Alpena, Mich., turn out brick at the rate of 50 and 100 brick per minute, respectively, giving them capacities of 30,000 brick and 60,000 brick per ten-hour day. The powerful tamping to which the brick are subjected turns out an unsurpassed quality of product, which will meet every practical demand. When properly made the brick develop a crushing strength of better than 400 lbs. per square inch in thirty days' time.

The brick are subjected to the tamping impact of a heavy forged steel tamper, having a face the dimension of the brick, weighing 200 lbs. and dropping a distance of 14 inches. As the brick are only 2¼ inches high this produces a very dense, hard and low water absorption product.

The Kampeska Materials Co., Sioux Falls, S. D., have equipped their quarry for the production of the smaller sizes of crushed quartzite for stucco finishing. The material is of reddish tan and free from rust-producing minerals.

The Carkson Cement Brick & Tile Co., Toronto, Canada, has filed articles of incorporation.

The Montrose Cement Products Co., Montrose, Ark., has increased its capital stock to $15,000.

The Shope Brick Co. of Wisconsin, Milwaukee, Wis., a new organization, is completing the erection of

a manufacturing building 70 ft. x 150 ft.fl, of concrete brick wall construction, costing approximately $35,000. The complete plant will comprise several buildings, all of modern design and construction for the production of Shope concrete brick.

Biddle Concrete Co., Clarksburg, W. Va., operate a Jaeger-Kenny block machine, capacity 1,000 blocks per day (this machine is for sale, first-class condition), Rober & Lang sewer pipe molds, Norwalk Mould Co's. burial vaults and a Jaeger mixer. Are interested in Mica Spar Crystals, marble chips, and white sand for facings, vibrating machine and transfer cars.

Twentieth Century Concrete Block Co.,Audubon, N. J., operates a Besser power tamped block machine and mixer, Norwalk burial vault molds and Multiplex chimney block machine.

The Saukville Cement Tile Co., Saukville, Wis., have a Schenk drain tile machine for sale.

The Crown Sidewalk & Block Co., Minneapolis, Minn., has been organized, capital $50,000, by E. W. Anderson and P. L. Anderson.

Concrete Products & Building Co., 130 Tenth street, Wheeling, W. Va., have their new plant in operation. They operate a Champion roofing tile machine, Hobbs block machine, Anchor tamper, Peerless brick machine and a Dunn and Kent continuous mixer. Are interested in molds for making silos, building tile, burial vaults, vases, sewer pipe, porches and flower boxes.

Davis Bros., Virden, Ill., operate a U. S. Standard block, Schenk drain tile, Anchor tamper and a Perfection mixer. Interested in building blocks, drain tile, septic tanks and a

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The Ambi Industrial Works have established offices at 90 West stret, New York, N. Y., for the purpose of introducing their Ambi cement roofing tile machine. Among the distinctive features of the Ambi machine are the devices for tamping, troweling and coloring the tile by an entirely mechanical process, uninfluenced by the skill of the individual operator. This insures the production of a tough, impermeable, everlasting cement tile, thereby filling a need long felt by manufacturers of cement products and builders in general.

Nebraska Cement Stone Co., Wahoo, Nebr., has for sale a Monarch drain tile machine for tile 5 to 18 inch diameter, three Ideal block machines and tampers.

Granette Products Co., Des Moines, Ia., announce that they will make exclusive contract for use of their patents in non-competing territory. You can make more money, they declare, by making signs, building trim, monuments and other quick selling, big profit lines of lettered Granette, a new concrete product. Sells at half the price of Granite, with twice the profit to you.

W. A. Pickernell, Neola, Ia., operates a "Double-Speed" block and brick machine made by Wood Bros., Des Moines, Ia. With plenty of help he can turn out 10 to 15 thousand brick per day. Mr. Pickernell also makes concrete fence posts and has a Snell mixer. He states that he will buy a new mixer next season.

The Lafayette Motors Co. are building 150 houses for their employes in Indianapolis. No two of the houses are alike. They are all modern, well built and range from a 4-room bungalow to a 2-story, 8-room house. All will have concrete tile roofs, with basement of formed concrete.

The plant of the Tekoppel Block Co., Evansville. Ind., recently organized, capital $50,000, will have a daily capacity of 1,000 waterproof building blocks.

Machines for Drying Coal, Sand, Cement Materials, Etc.

Pulverized coal has been used as a fuel in rotary kilns for the burning of cement for over thirty years, and, on account of the increasing scarcity and high cost of fuel oil and natural gas, has in the last few years rapidly replaced oil and natural gas in reverbatory furnaces, open hearth steel furnaces, malleable iron furnaces, boilers, etc.

Moisture in pulverized coal has probably caused many failures of such installations in the past, a few of the difficulties due to moisture in powdered coal being the packing of the fuel in the bin, the non-uniform feed of controller, filling of screens in pulverizers, reduction of the flame temperature and many others. It is, therefore, a safeguard to the operation of a powdered coal plant that all the coal be properly dried. Care must be taken, however, in drying the coal that it is not overheated, not only because of the danger of the coal catching fire while being dried, but also to prevent volatiles being driven off while the coal is being dried.

Bituminous slack and anthracite screenings are now being briquetted in large quantities. Before the coal is mixed with the binder in a briquetting process, it is necessary to have it thoroughly dried and heated.

Coal is also being dried for coke oven use, as elimination of the moisture results in a great saving of oven linings, as well as increased capacity of the ovens Coal is also being dried before introduction into electric furnaces for the manufacture of calcium carbide.

The Class "A" dryer manufactured by Ruggles-N. Y., is particularly adapted to the drying of coal as Coles Engineering Co., 50 Church St., New York, it is the only direct heat dryer which can be used for this purpose without danger of ignition or explosion of dust. Freedom from this danger is due to the low temperature of the products of combustion when they meet the drying coal.

Cement Materials

In probably no other industry is the machinery employed subjected to harder and more continuous work than in the manufacture of Portland cement. A cement plant must run continuously, day and night—sometimes for fifty-one weeks in the year—and when a machine breaks down, in nearly every instance operation of a large part of the plant is immediately curtailed. It is probably due to this necessity for continuous operation without breakdowns that "Ruggles-Coles" Dryers have been used so extensively in this line of work.

Various combinations of materials are used in cement plants, including limestone, cement rock, chalk, marl, clay, shale or granulated slag. All of these must be thoroughly dried before being finely pulverized for burning.

A Bright Future Looms Up for the Building Industry in 1921

ARRANGE TO-DAY TO GET YOUR

Helm Brick & Block Press

Bricks and blocks produced on a HELM PRESS are the finest looking and the most permanent, because the machine comes down with a pressure of 40 tons on the medium wet concrete, which welds all the elements of these materials so as to be able to resist fire, moisture, wear and tear.

Another reason why you should buy a Helm Machine is that your production is unlimited—you can turn out 15,000 brick or 1,500 24-in. blocks in a day if you wish.

And finally, the Helm Press is built to last—to produce for you year after year without complaint, without repairs.

Write for Free Book on Successful Brick and Block Making

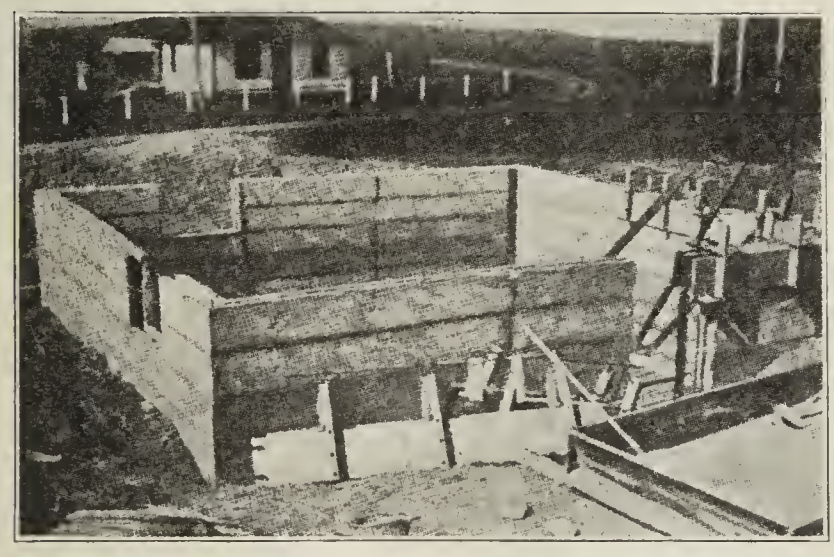
The Helm Brick Machine Company

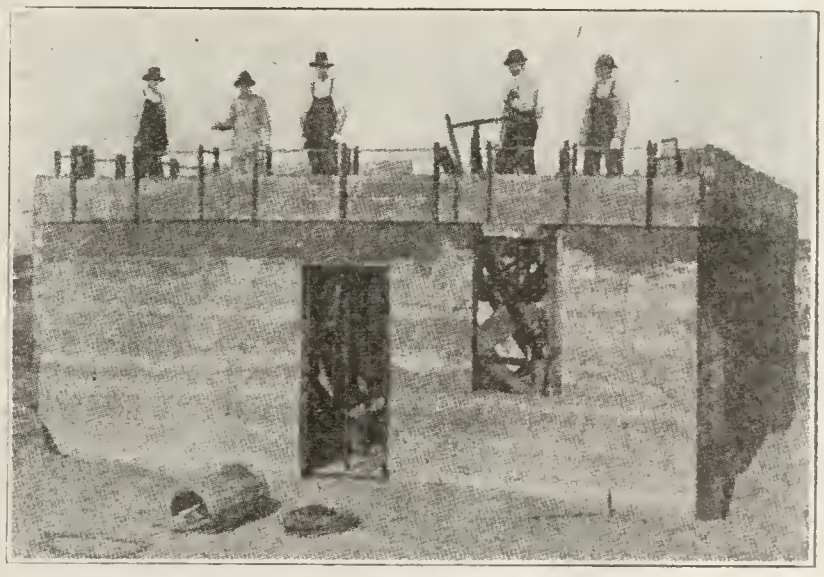
762 Mitchell St., Cadillac, Mich.

See us at Own Your Home Exposition, the Coliseum, Chicago, March 26 to April 2, Booth 305

FROST HOLLOW WALL FORMS

ADJUSTABLE TO ANY KIND OR SIZE OF BUILDING





With our forms you can build a double wall, reinforced concrete building to compete with the cost of frame construction.

Moisture-proof, fire-proof, repair-proof walls. Save paint, lath, time and labor to you. Save repair, fuel and insurance to the owner.

Forms adaptable to any size building, adjustable to any thickness wall. Built of poured concrete, reinforced three ways with continuous dead air space makes the most desirable method of building construction. Simple to use, easily adjustable. No skilled labor required. Method has been tried and proven.

Write for complete description of method and its operation, photos showing work done, and costs.

HOLLOW CONCRETE WALL CO.

H. T. FROST, PRESIDENT — MITCHELL, SOUTH DAKOTA

the 3 essentials

Correct Mixing

Minimum Labor

Quality Products

The three elements to successful concrete block and tile factory operations are inherent characteristics of Kent Continuous Mixers.

Write for Catalog

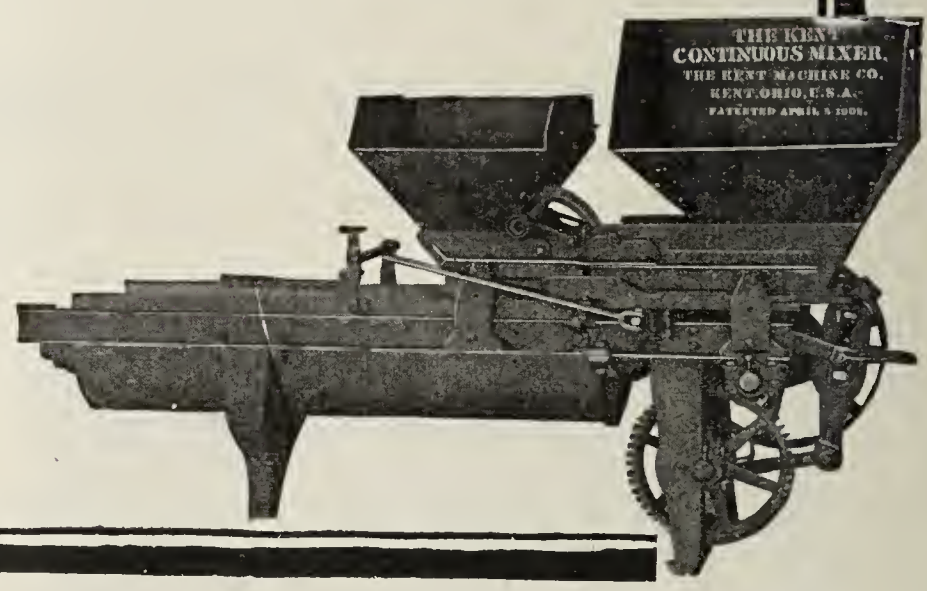
The Kent Machine Co.

Kent, Ohio

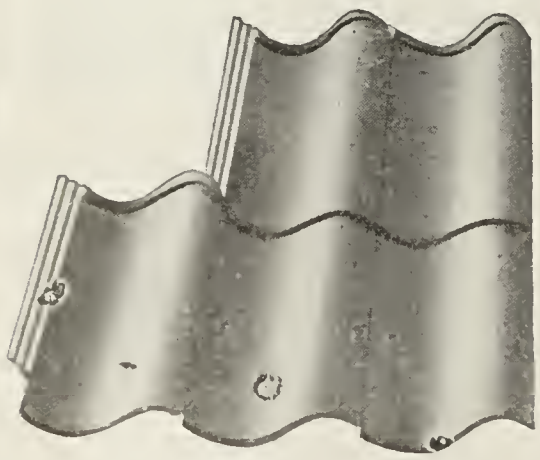
First, the Kent insures correct mixing. It is accurate in measuring, correct in proportioning, and thorough and uniform in mixing the aggregates for QUALITY concrete blocks and tile—at low cost.

Second, the Kent is a labor saving machine and holds down your pay roll. It does its own measuring, proportioning, mixing, watering and discharging accurately. The Kent operates entirely by itself. Unlike batch mixers, it requires no man labor beyond the loading operation. Keep the hoppers filled with sand and cement and the Kent automatically will serve to your block machines charging platform a continuous stream of perfectly mixed and moistened material.

Third, the Kent insures Quality products because it is designed especially for concrete products factories. It is simple to operate and does away with the cumbersome hoisting cars, charging platforms, chains, cables and whatnot found on many of the old-fashioned batch mixers.



The U. S. Champion Tile



SPANISH TILE

Is a perfect and everlasting concrete roofing of artistic beauty in any color desired. Easily made and applied by anyone.

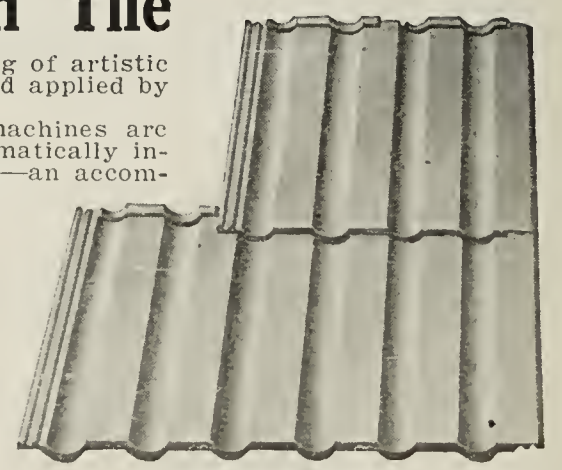
Our newly improved and patented tile machines are provided with a new device that makes automatically interlocks on both ends and sides of our tiles—an accomplishment of immense value for the roofing tile problem and characteristic for our tiles only.

Buy the U. S. CHAMPION TILE MACHINES for making FRENCH or SPANISH TILE. They help progressive builders and concrete products manufacturer cutting down the high building material costs besides giving large returns from a small investment.

Write for description and prices.

L. HANSEN CO.

3617 East 23rd St. Kansas City, Mo.



FRENCH TILE

A BIG DEMAND FOR THESE VAULTS

—PROFITS LARGE—

With our Adjustable Steel Molds you can easily make any size of the Automatic Sealing Burial Vault at an exceedingly low total cost.

When once they are seen and used in a community the Automatic Sealing Burial Vaults come into instant demand. They are far superior in every way to any other cement or steel vaults.

The manufacturing of these Automatic Sealing Burial Vaults with our Adjustable Steel Molds is a big money making opportunity. The first ten vaults you sell will more than pay back your entire investment—materials, molds, time, etc., etc.

Write us for complete particulars.

Automatic Sealing Vault Co.
216 E. River St. PERU, IND.

Medusa White Cement *Keeps* Its Whiteness

You can depend on results when you use Medusa Stainless White Cement—whether in special trim as shown here, for stucco, for laying face brick, or for any other cement work where permanent freshness and color values count.

With the addition of Medusa Waterproofing, your work can be made moisture-proof for all time. We furnish cement already waterproofed, or supply the waterproofing separately.

Booklets gladly sent upon request

THE SANDUSKY CEMENT COMPANY
Department E Cleveland, Ohio

Ask to have your name placed upon the complimentary mailing list of "The Medusa Review."

MEDUSA Stainless White Cement

BUCYRUS

Bucyrus Steam Shovels are built with the strength and ruggedness to dig rock with the lowest cost of maintenance.

Bucyrus Steam Shovels are built in sizes for every requirement.

Immediate delivery on railway type shovels.

Write for Bulletin A. G.

We build all sizes of steam and electric shovels for quarry service—revolving shovels—dragline excavators—dredges, etc.

New York
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BUCYRUS COMPANY

Denver
San Francisco
Salt Lake City
Portland, Ore.
London, England

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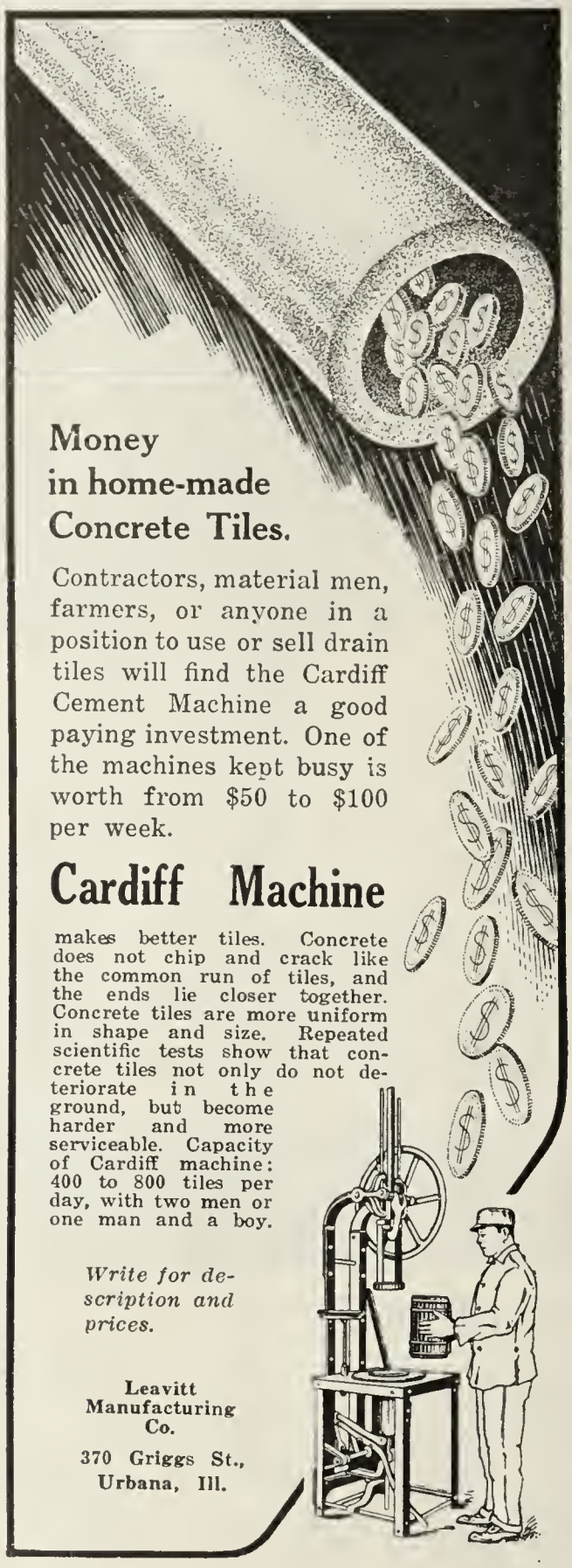
SOUTH MILWAUKEE, WISCONSIN, U.S.A.



Money in home-made Concrete Tiles.

Contractors, material men, farmers, or anyone in a position to use or sell drain tiles will find the Cardiff Cement Machine a good paying investment. One of the machines kept busy is worth from $50 to $100 per week.

Cardiff Machine

makes better tiles. Concrete does not chip and crack like the common run of tiles, and the ends lie closer together. Concrete tiles are more uniform in shape and size. Repeated scientific tests show that concrete tiles not only do not deteriorate in the ground, but become harder and more serviceable. Capacity of Cardiff machine: 400 to 800 tiles per day, with two men or one man and a boy.

Write for description and prices.

Leavitt Manufacturing Co.
370 Griggs St.,
Urbana, Ill.

SAVE CEMENT

Salvage from 5 to 10 sacks of good cement from each 1,000 empty sacks and reduce labor by one-half—by cleaning them in our

Unit Sack Cleaner

Write us for particulars.

Handy Sack Baler Co.
620 S. 2d St.,
Cedar Rapids, Iowa

SELECTED WHITE SAND

UNEXCELLED FOR

Facing Concrete Blocks, Ornamental Concrete Stone, Hard Plaster, Finishing, Exterior Plastering, Roofing, Stone and Marble Sawing, etc.

Prices, Freight Rates and Samples on Application
Shipped in Paper Lined Box Cars
Small Shipments in 175-lb. Bags

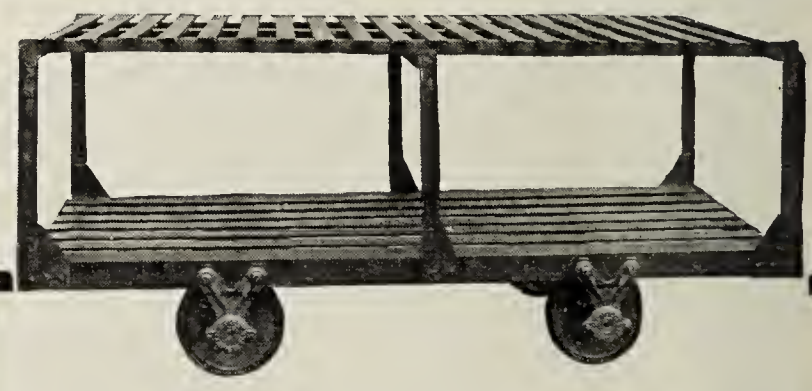
Ottawa Silica Company
OTTAWA, ILLINOIS

CONCRETE SEPTIC TANKS

—an Independent Business

Install Sanitary Septic-Tanks. Every home outside of a sanitary sewer district needs it. A one-piece Tank Installed in Place; Self-Cleaning Vault. Large profits, quick returns. Every customer advertises the Septic Tank for you. Only a small investment required.

M. J. GRIFFITH, Inventor
Office 313 E. Tus. Ave. Barberton, Ohio



Conco Cars are distinctly "Quality" cars—specifically built to produce a degree of efficiency and dependability that will keep operating and maintenance expenses down to a minimum. All that superior workmanship, the very best of materials, and the careful inspection of materials and castings can contribute to this end, is utilized in the modern and finely equipped Conco factory.

They meet a long felt want among concrete products manufacturers and are moderate in price.

H. D. CONKEY & CO.
MENDOTA ILLINOIS

SAND PUMPS

That pay the largest dividends per dollar of investment.

"The Pump That Makes The Money."

This Pump is all that is implied in the name

LIGHTNING

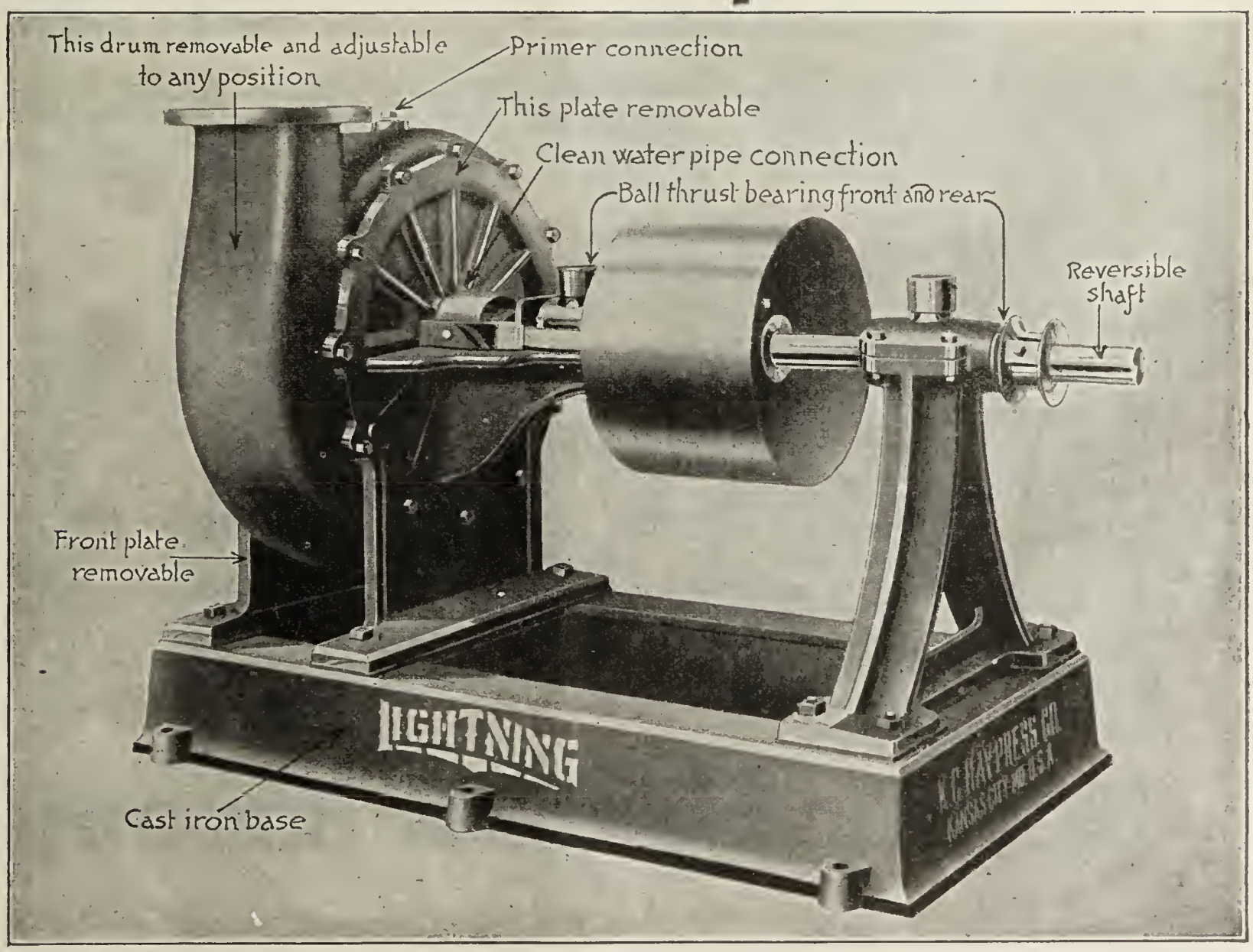
Its rugged construction and Simple operation assures maximum efficiency in operation at all times.

It is easy to adjust and easy to replace parts. Thousands in successful operation are striking endorsement of their dependability.

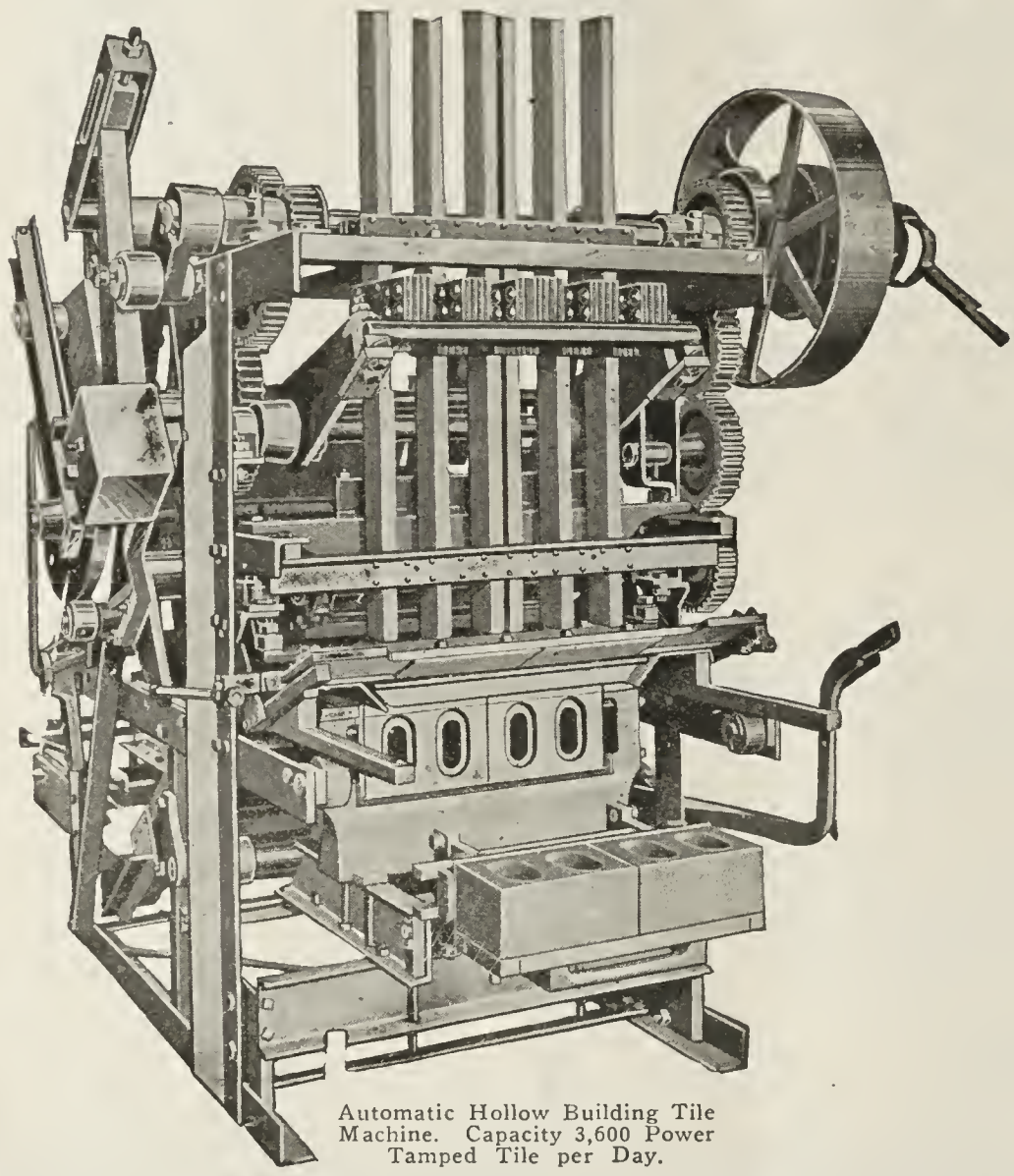
KANSAS CITY HAY PRESS & TRACTOR COMPANY

KANSAS CITY, MISSOURI

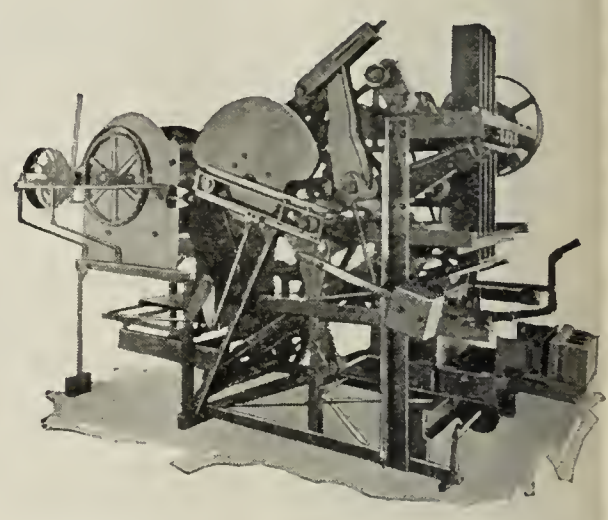
THE PUMP OF SIMPLICITY AND STRENGTH



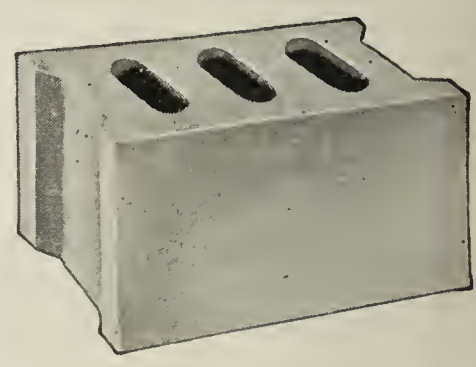
Besser Large Capacity Automa



Automatic Hollow Building Tile Machine. Capacity 3,600 Power Tamped Tile per Day.



Single Automatic Block Machine—Capacity 1,800 Power Tamped Blocks per Day.



THIS IS THE

Get your equipment now before the late-season rush begins. Lay your plans while there is time to investigate the kind of equipment you want—time to get that equipment—time to install it to obtain the maximum of output at the minimum of labor costs. Be ready to meet the demand when it comes. Our Engineers are ready to help you.

ABOUT TAMPING

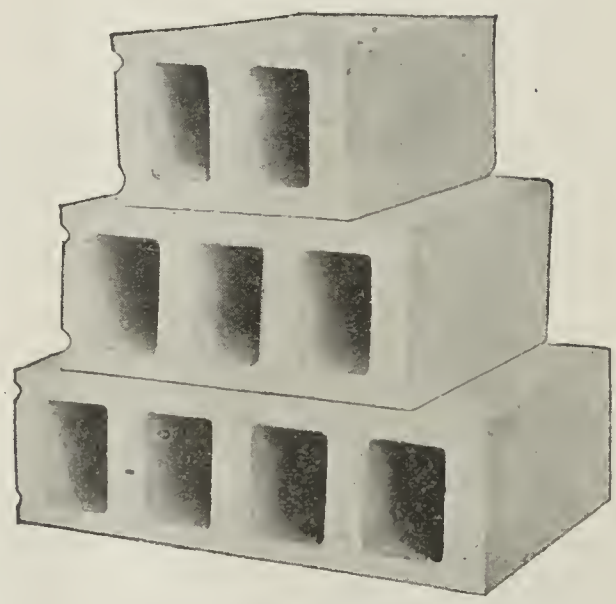
Powerful tamping is a feature of all Besser power machines. Concrete is discharged into the machine supply hopper, automatically elevated and distributed into the mold box under the tampers. Each tamper strikes with an impact of over 1,000 lbs. They drop simultaneously, compacting only 1¼ lbs. of concrete with each blow on the block machine, and ⅘ lb. on the tile machine. Charging and tamping is repeated **eight times.**

Next, surplus concrete is removed, a finishing plate moves in over the mold box, and the tampers descend, striking three blows with their combined weight, still further compacting the block or tile to maximum density.

Not a lever to be pulled in any of these operations—**it's entirely automatic.**

Larger profits without raising prices—more business—better satisfied customers—have been the experience of Besser owners. Why not make it your experience? Read what some of them think of BESSER MACHINERY.

Better own a BESSER than compete with one.



THE BES

Single Automatic Block Machine for standard 8x8x16", 20" and 24" blocks.

Double Automatic Block Machine for standard 8x8x16" block.

No. 1 Automatic Brick Machine. Daily capacity, 60,000 tamped brick.

No. 2 Automatic Brick Machine. Daily capacity, 30,000 tamped brick.

Double Automatic Machine for light weight hollow building tile in sizes 5x8x12" and 5x12x12".

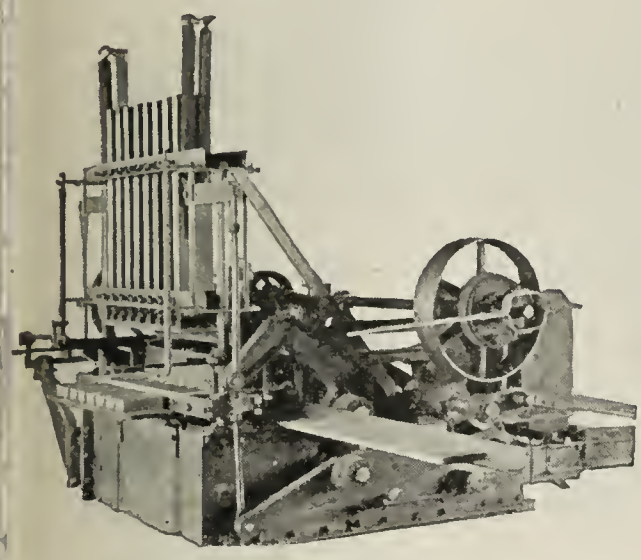
Double Automatic Machine for 4", 5", 6", 8x8x12" hollow partition tile.

No. 1 Drain Tile Machine for diameters 3 to 16" and in 12", 18" and 24" lengths.

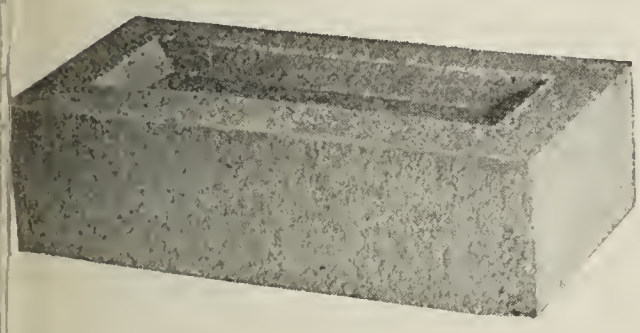
No. 2 Drain Tile Machine for diameters 3 to 12", in 12" lengths.

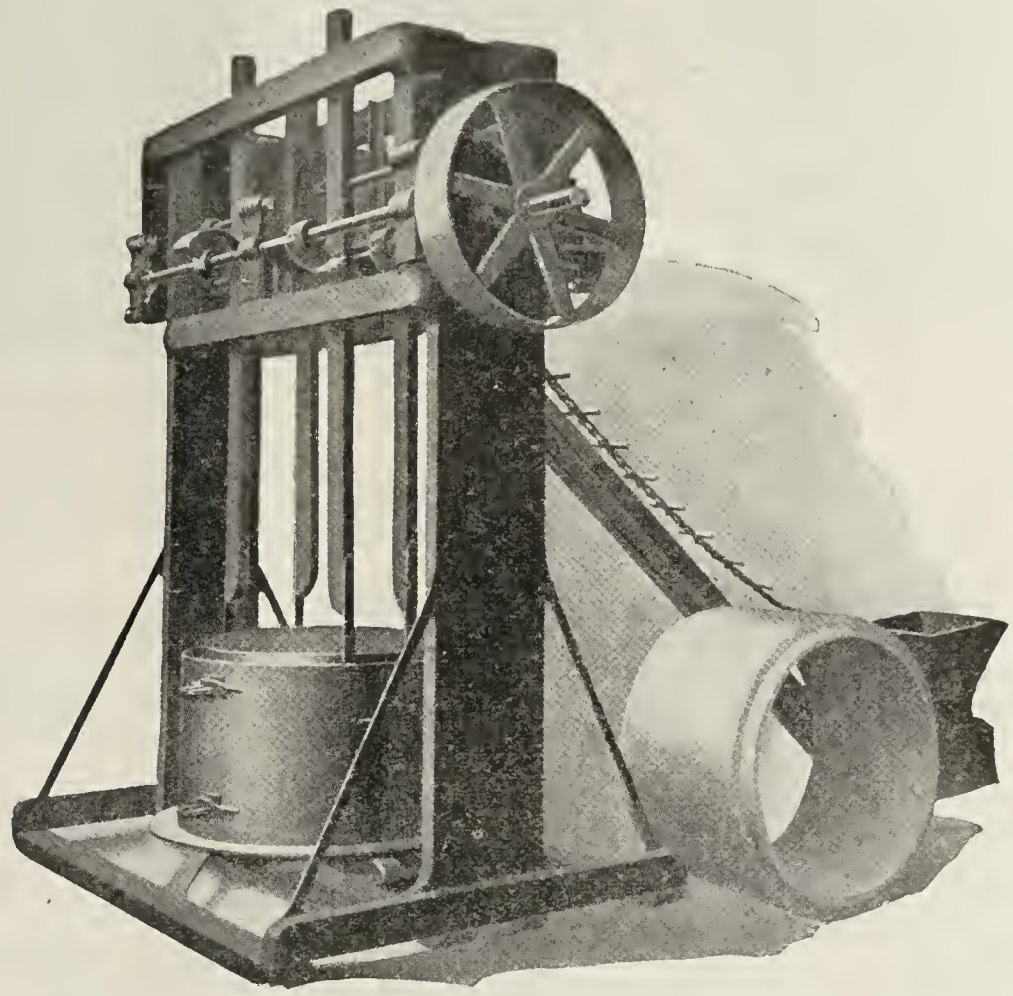
Besser Sales Company, 1302

c Concrete Products Machinery



o. 1 Automatic Brick Machine. Capacity 60,000 Power Tamped Bricks per Day.





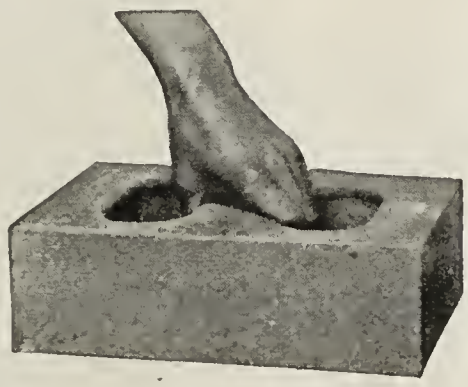
No. 3 Automatic Drain and Sewer Pipe Machine. Capacity 600 24 in. Diameter Pipe per Day.

TIME TO PREPARE

he BESSER LINE is complete. It contains everything for the production of concrete products—from the ghest grade hand-operated machine to the speediest, absolutely automatic power machine of largest capacity. Whatever the products that you want to manufacture, whatever the equipment you may have been considering—tter first learn what BESSER has to offer.

SER LINE

- o. 3 Power Tamp Drain Tile and Sewer Pipe Machine for diameters 6 to 36", and in 24" and 30" lengths.
- ment Silo Stave Machine for 2½x10x30" adapted to 2" to 3" thickness—length 24-32".
- ain and Sewer Pipe Molds.
- imney Block Machine.
- and Brick Machine.
- and Block Machine.
- and Hollow Building Tile Machine—4 models for special sizes and shapes.
- and Drain Tile Machine.
- cu. ft. Batch Paddle Mixer.
- ntinuous Mixer, capacity up to 100 cu. yds. per hour.
- rs, pallets, motors, belting, everything for the complete products plant.



WHAT BESSER OWNERS SAY:

Mr. J. A. Gibson, 199 Rano Street, Buffalo, N. Y.:
"I purchased one of your 16-in. machines nearly two years ago. I do not believe there is any block machine on the market today that can equal it in speed or quality of block."
Mr. Clarence V. Bertsch of Bertsch Brothers, Richmond, Ind.:
"Referring to our Besser Block Machine: We are well pleased with the work that it is doing as to quality, speed, convenience, and especially as to the amount of labor it saves compared to the method we employed previously."
Jas. D. Pasquale, Vineland, N. J.:
"We have used a Besser for almost three years, and have found it entirely satisfatory, which has enabled us to keep up with enormous demands for cement block."
A. F. Schaefer, of Schaefer Bros., Rochester, N. Y.
"We believe they are the best built block machines on the market today. We have tried out three or four different makes of machines, and would certainly not hesitate to recommend the Besser Machine to anyone." Scores of others give similar reports.

1st Street, Alpena, Mich.

This house was built more than ten years ago with "Perfect" Products.

Get the house building business of your town with $100 Profit Daily from

PERFECT Concrete Block and Brick Making Equipment

Material prices will be down far enough to start building going—especially house-building.

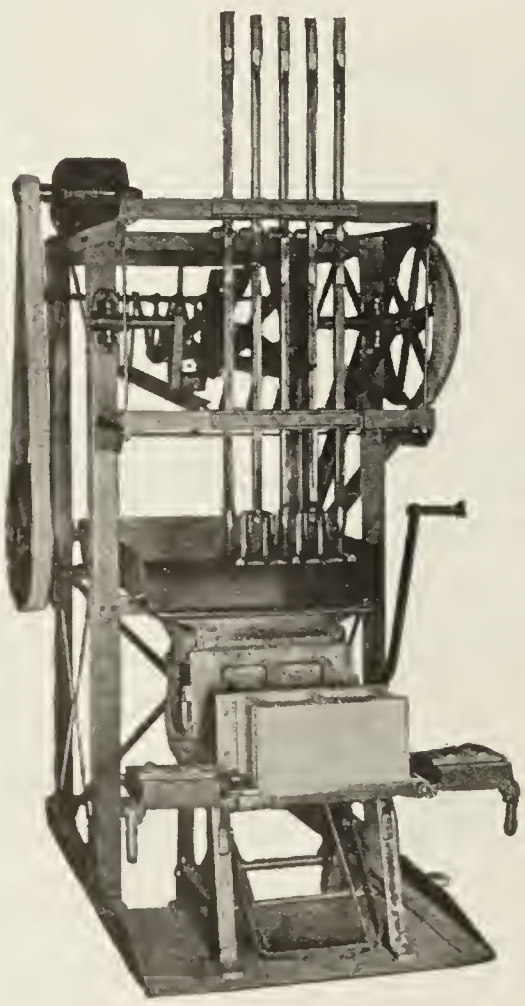
But lumber will never come down far enough to bother a man who is making concrete blocks or brick.

Now is the golden opportunity for the concrete products manufacturer, if he moves quickly enough.

—if he starts **now** to equip his plant to turn out more block and brick than he ever dreamed before of selling.

—if he gets quick-action, repairless, reliable, automatic machines for making his products at low factory cost, in big quantities.

—if, in short, he will investigate "Perfect" Block and Brick Machines, install them, get them operating, make up a reserve stock and be ready to handle orders when the flow starts—and it'll start extra early this spring.



Block Machines

The "Perfect" unit shown at the left is gearless, quiet running, fast. It tamps the block automatically. The block machine may be purchased alone for hand operation.

Brick Machines

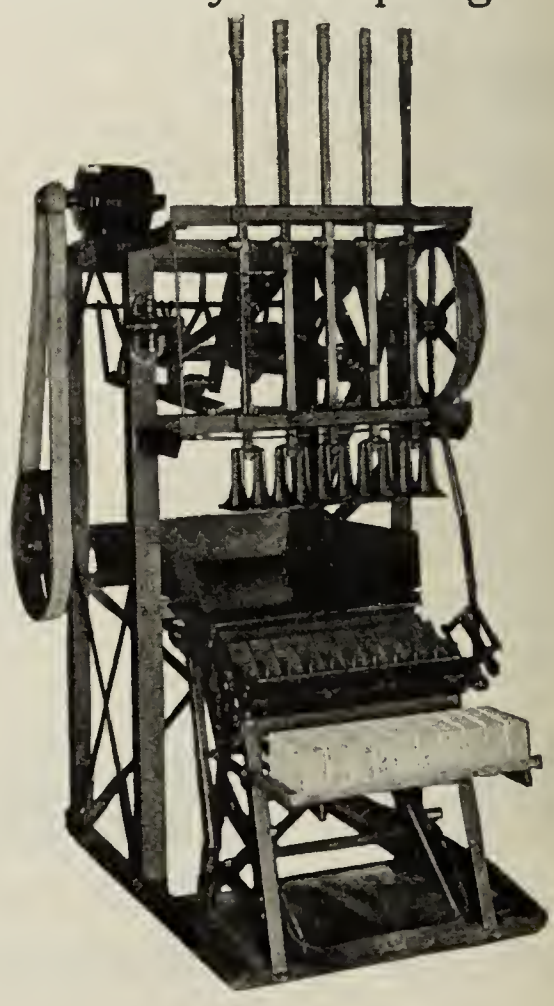
We show at the right the "Perfect" Brick Machine equipped with power tamper. Makes strong, hard, uniform brick, standing the tests of the best clay brick. Buy the hand machine by itself if you don't want a big output.

We will exhibit our full line at the Own Your Own Home Exposition, Chicago, March 26 to April 2.

Write us today for descriptive circulars.

The Wert Manufacturing Co.

547 Railway Exchange Bldg.
CHICAGO



EXPLOSIVES ~ SERVICE

COMPLETE—

From the Laboratory to the Point where Explosives are used

WE do not consider that our work begins with the manufacture of high-grade explosives and ends with their sale to the user.

Preceding production and progressing with it, come research and experimentation that require the work of over 300 chemical and ballistic engineers. Through their efforts, new and more efficient explosives are being constantly developed, and careful check is kept on every stage of manufacture, insuring that uniform high quality for which Du Pont Explosives have been noted for more than a century.

Their work is supplemented right at the point where explosives are used by a corps of highly trained field representatives whose business is to determine the most efficient and most economical type of explosives for every kind of work under every condition. And it is also their business to assist every user of Du Pont Explosives, whenever it is desired, by applying their specialized knowledge to the customer's particular work with a view to determining the most economical and efficient solution of his problems.

Perhaps these two—the "before" and "after"—features of Du Pont Explosives Service are largely responsible for the present confidence with which users of explosives regard Du Pont Explosives and the Du Pont Company.

Thousands use—and swear by—Du Pont Explosives Service. It is at *your* command as well.

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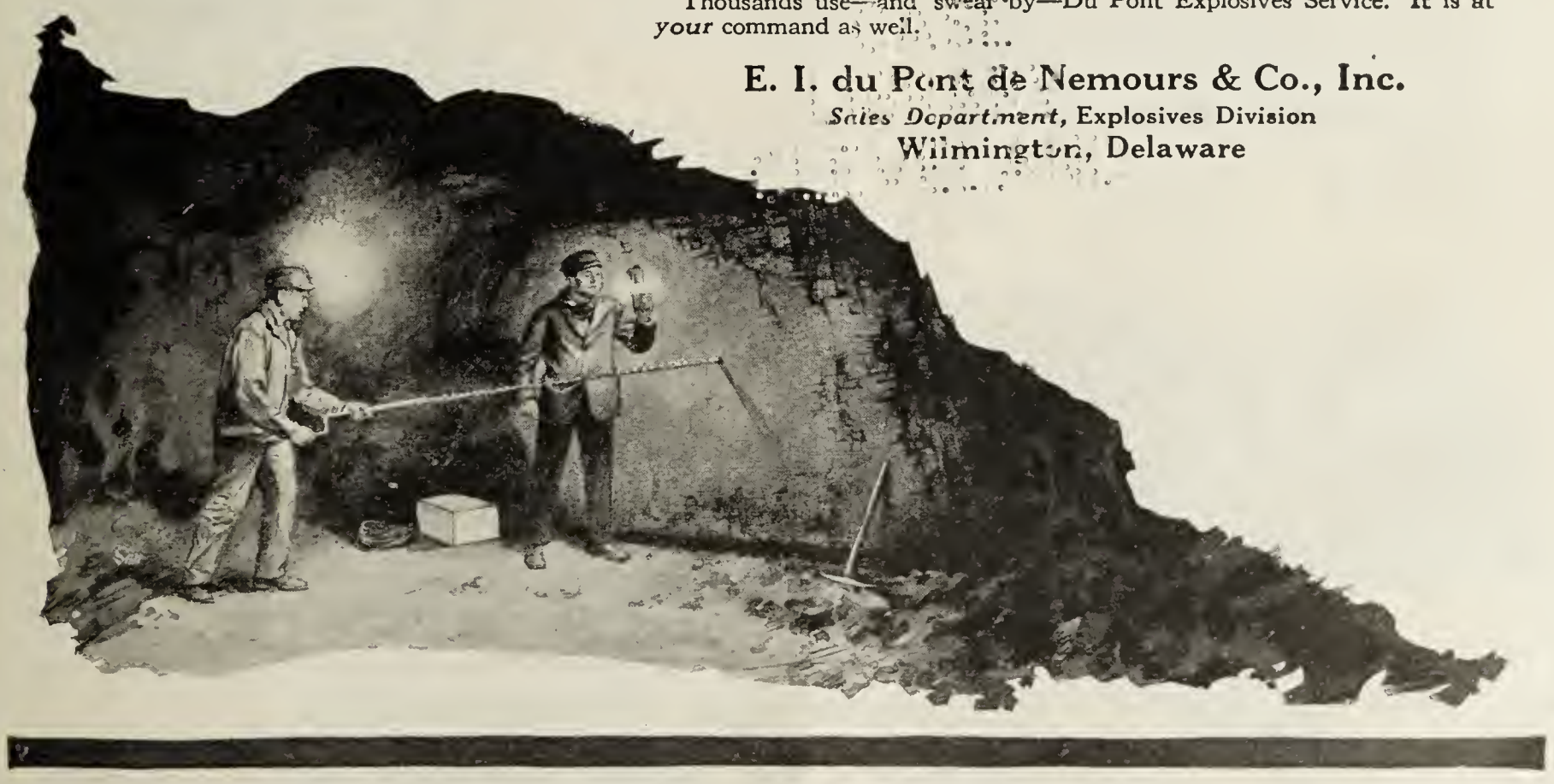


MARBLE CHIPS

At Wholesale

R. V. REYNOLDS CO.

1415 Railway Exchange : : Chicago, Ill.

SAUERMAN BOTTOMLESS POWER SCRAPERS ARE LABOR-SAVERS FOR SMALL GRAVEL PITS

Conservative claims for the smallest sizes of Sauerman Bottomless Power Scrapers, based on the statements of contractors and county road commissioners who are using them, are that a Sauerman scraper operated by one man will displace from 6 to 15 teams and slip scrapers. The larger sizes of Sauerman scrapers are considered by the commercial gravel producers who use them as being the equal of a small steam shovel with the added advantage that they will not only dig, but also convey the sand and gravel to the plant.

One road superintendent in Michigan who installed one of our ⅓ cu. yd. scrapers in the county gravel pit last Summer, writes in to say that it is saving the county $40.00 per day while doing the work that formerly called for a half dozen teams and scrapers.

A Wisconsin sand and gravel producer chose a Sauerman scraper in preference to any other type of equipment when he opened his first gravel pit about six years ago. Today he owns and operates four gravel plants and the excavating and conveying equipment is the same at all—Sauerman Bottomless Power Scrapers.

The many advantages of this one-man operated, combined excavator and conveyor are explained in our Pamphlet No. 10, with illustrations and diagrams of actual installations. Write for this booklet today.

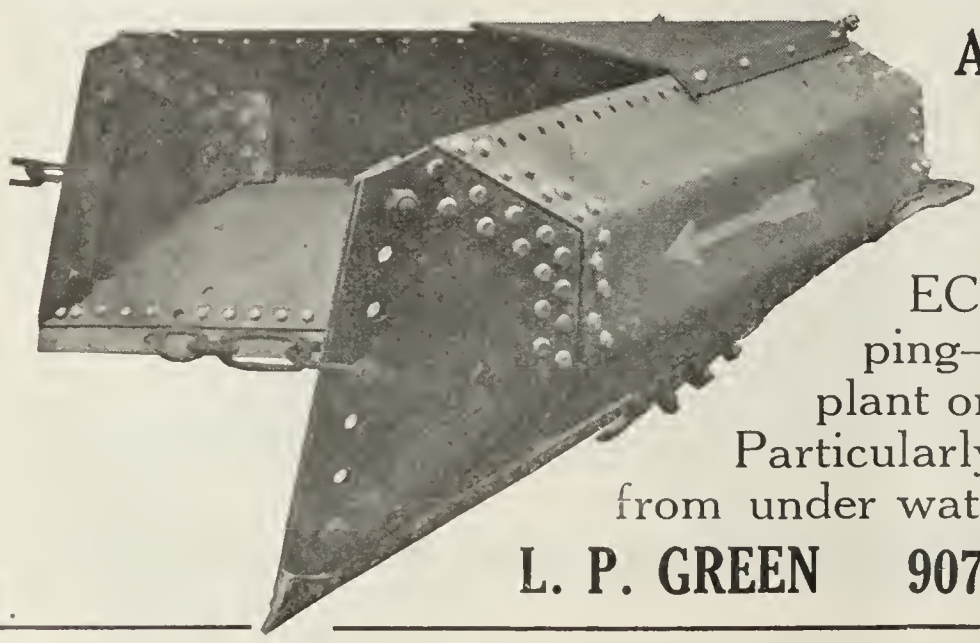
Typical installation of Sauerman Power Scraper for hillside gravel pits.

Also, for Handling Coal

We manufacture a special type of bottomless power scraper (shown below), that is extensively used for storing and reclaiming coal and similar loose materials. Full description on request.

Sauerman Bros., 1139 Monadnock Block, Chicago

Also Manufacturers of Sauerman Dragline Cableway Excavators

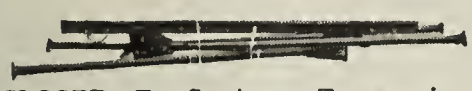


ARROW POWER DRAG SCRAPER

A Real Earth Mover

Operated by two drum hoist. It will do excavating work of all kinds ECONOMICALLY. Grading—Stripping—Delivery of material from pit to plant or bins or for wagon or truck loading. Particularly adapted to hillside deposits or from under water. Write for catalog.

L. P. GREEN 907 Lumber Exchange Bldg. Chicago



CLOSED—For Storing or Transporting.

ECONOMY STEEL SCAFFOLDING

is being used by a number of leading Chicago contractors, such as Thompson Starrett Co., R. C. Wieboldt, Blome Sinek, E. W. Sproul & Co., Math Rauen Co., Gerhardt Meyne and many others, who will gladly recommend them to every contractor as a good asset in equipment.

The illustration is of the Mason Horse 4 ft. 6 in. high and 5 ft. 0 in. wide which welghs but 60 lbs., they are sturdy in construction and their compactfulness when folded makes them very easy to handle, transport or store.

A TRIAL ORDER WILL CONVINCE YOU THAT THEY ARE A NECESSITY.

Price $6.00 each, F. O. B. Chicago.

ECONOMY SCAFFOLD CO.

4611-19 West Fulton St. **CHICAGO, ILL.**

CRUSHERS

1—18 Gates K.
1—12 Gates K.
1—7½ Austin.
1—7½ Gates.
1—No. 6 Austin.
1—No. 5 Austin.
2 sets 36-in. Rolls.
1 set 42-in. Rolls.

LOCOMOTIVES

1—50-Ton Baldwin 6-Wheeled Switcher.
1—35-Ton Baldwin 4-Wheeled Switcher.
1—20-Ton Saddle Tank, and others.

STEAM SHOVELS

1—Marvin 60—2½ yd.
1—Bucyrus 70-C—2½ yd.
1—18-B Bucyrus Traction
1—A-1 Thews
1—O Thews.

Bargains in quarry equipment, including elevators, screens, compressors, drills, hoisting engines, boilers, etc.

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538 South Dearborn St. **Chicago**

Do Business by Mail

Start with accurate lists of names we furnish—build solidly.
Choose from the following or any others desired.

Apron Mfrs.	Wealthy Men	Fly Paper Mfrs.
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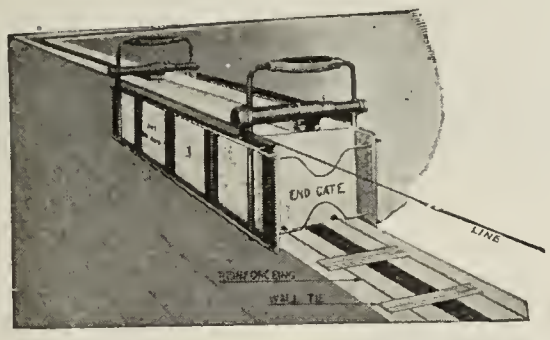
Our complete book of mailing statistics on 7000 classes of prospective customers for the asking. You need it.

Ross-Gould, 455C N. 9th Street, St. Louis.

ROSS-GOULD Mailing Lists St. Louis

Build the Hollow Wall Way



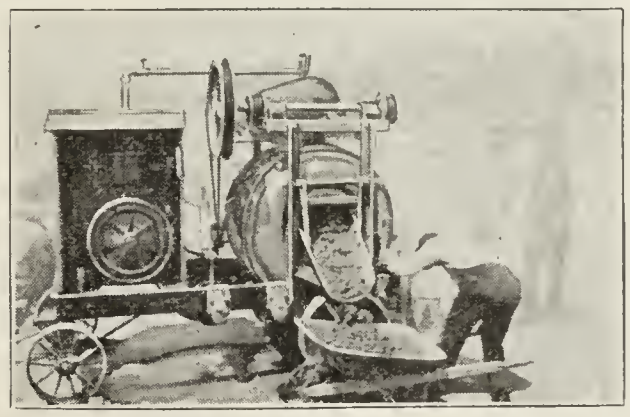
Like a thermos bottle—warmest in winter—coolest in summer. Fire-proof—everlasting.

Cheapest, best and most perfect way known to the building world.

The reason the most wall can be built for the least money with our forms is—because they are STRONGEST—LIGHTEST—SIMPLEST and MOST PERFECT, and the price of a complete set can be saved on one small job. Send for literature.

The Universal Cement Mold Co.

North Milwaukee **Wisconsin**



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Represents the best established practice in Concrete Mixer Construction.

Its dependability and simplicity commends it to the contractor who appreciates the importance of uninterrupted service.

The Atlas is made in various sizes and styles. Let us mail you our catalogue.

Send for it today—NOW

ATLAS ENGINEERING CO.

3023 Lisbon Ave. **Milwaukee, Wis.**

P. S.—If you are interested in material handling equipment, let us mail you our ATLAS Wagon Loader, Box Car Loader, Car Unloader, Belt and Bucket Conveyor and Portable Storage Bin catalogue. The catalogue is yours, simply ask for it.

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PURIFICATION SYSTEMS
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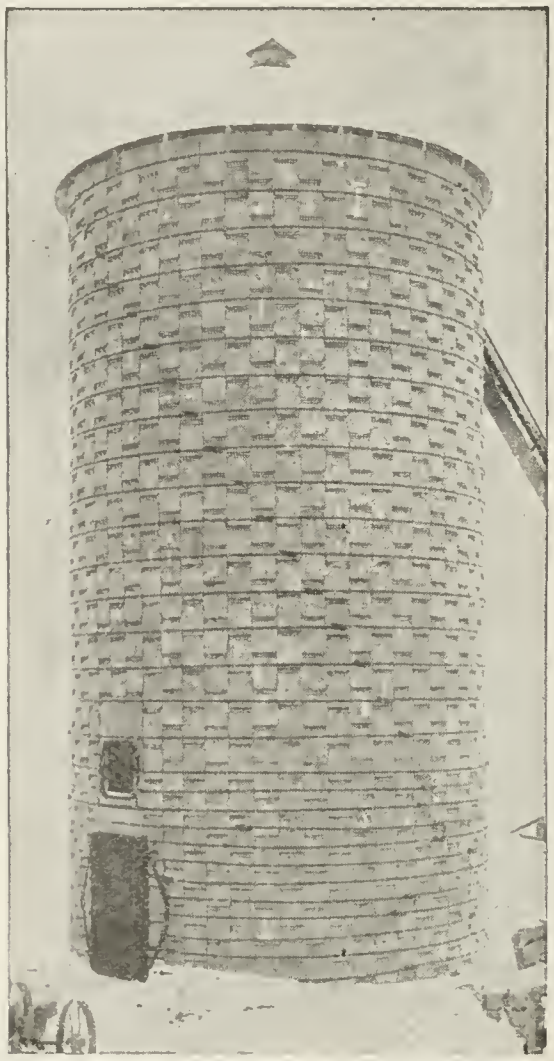
CONVEYOR BELTS A SPECIALTY

THE IREY SUCCESSFUL AND ECONOMICAL METHOD OF CONSTRUCTION



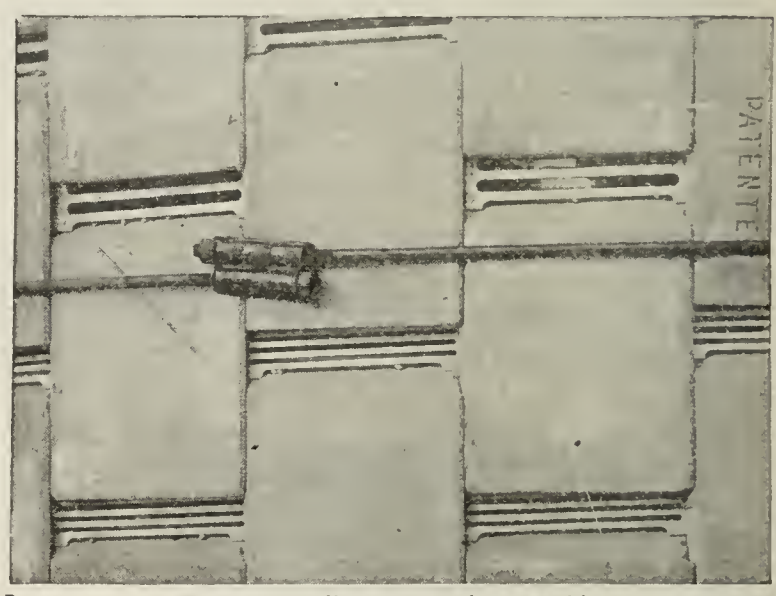
Irey cement stave corn crib on the farm of W. W. Walters, Wiota, Iowa—a fireproof, ratproof, and permanent structure.

Gives every rural contractor an opportunity to take advantage of the large demand for better Corn Cribs. Every farmer is a prospect for a concrete crib.

THE IREY PATENTED VENTILATED CONCRETE STAVE CORN CRIBS

are so built as to admit air and exclude rain and snow.

Making the staves is simple. Erection rapid. Every farmer is a booster. Any concrete man can establish a good paying business manufacturing and erecting these cribs. Investigate our proposition. Write for details.



Irey cement stave corn crib construction combines permanence and ease of operation with ample circulation through the contents.

CONCRETE PRODUCTS CORP.
WEST LIBERTY, IA.

For FIRE BRICK and DUST
Specify
CRESCENT QUALITY
THE UTMOST IN
FIRE CLAYS

CRESCENT REFRACTORIES CO.
Curwensville, Clearfield Co., Pa.

"HERCULES SOLID WELD"
STEAM SHOVEL CHAIN

The Chain that puts the SHOVE in Steam SHOVELS

MADE ONLY BY
THE COLUMBUS McKINNON CHAIN CO.
General Offices: COLUMBUS, OHIO

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VALVE BAGS
INSURE SAFE DELIVERY

If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

THE VALVE BAG CO. OF AMERICA
TOLEDO, OHIO

for facing concrete work

FOR the stucco suburban home—the modern public utility plant and factory—the bank and office building—first call is for Middlebury Terrazzo for facing concrete work.

Middlebury Terrazzo has all the appearance of solid marble—with all its advantages and at a material saving in price.

Made from Middlebury White and Crême Statuary Marbles, it is furnished, carefully graded to size, in either dust, No. 1, 2 or 3.

Send today for free samples and prices

Middlebury Marble Company
BRANDON, VERMONT

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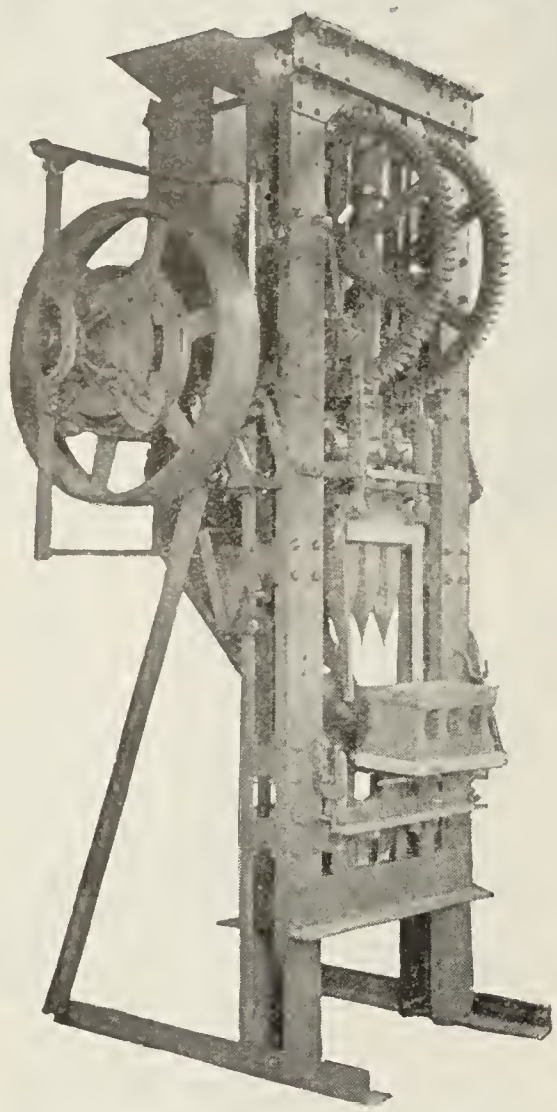


Introducing an absolutely new and original method of manufacturing concrete blocks. ALL AUTOMATIC. Each stroke of the plungers makes and delivers a complete block—a block which is dense, true and easy to lay. A guaranteed output of over 2000 blocks per day with four men. No other equipment will give you this production per man.

We also manufacture the following well known machines:

The Hobbs Down Face Block Machine

The Anchor Continuous Air Space Block Machine

The Anchor Automatic Tamper made to operate over any type of block, brick or stave machine.

The Anchor Batch Mixer—a mixer designed for concrete products plants.

Let us tell you more about this reliable line of equipment.

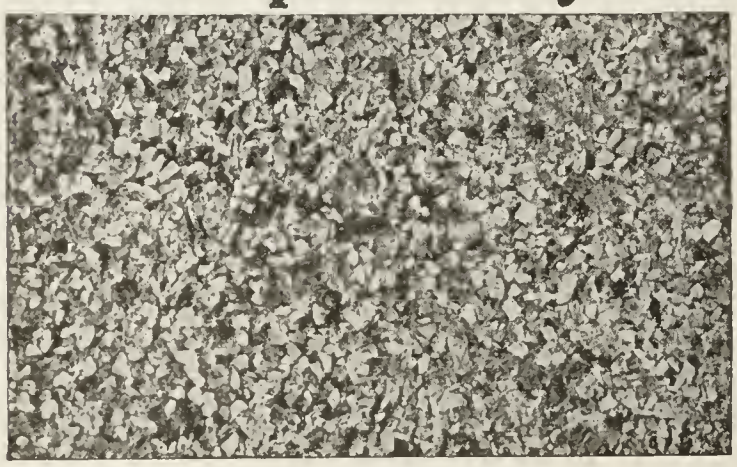
The Anchor Concrete Machinery Co.

Home Office: Rock Rapids, Ia. Branch: Columbus, O.

Concrete Blocks, Bricks Building Trim, Posts, Ornamental Work, Etc.

WHEN FACED WITH

Mica Spar Crystals



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SPARKLING GRANITE

Beautiful, Artistic and Everlasting

Made in six scientifically milled sizes, extremely hard, sharp and free from dust. Insures strength and beauty. Booklet "Micaspar and How to Use It," with free samples mailed on request.

Crown Point Spar Company, Inc.

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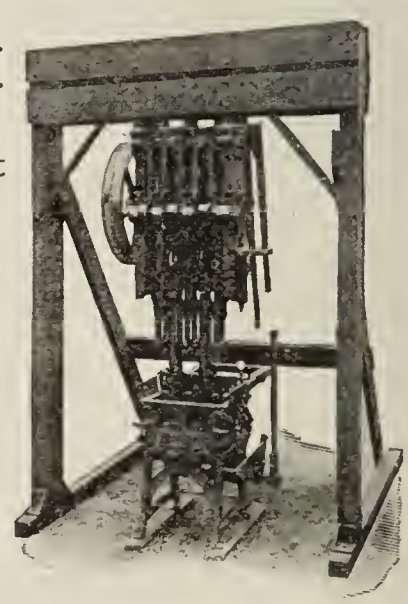
In Seven-League Boots

A Bright Future Looms Up for the Building Industry in 1921.

LET'S GO!

Arrange today to get your



Ideal

Block Machines

and you will be in position to care for a substantial share of this profitable business, because you can turn out plenty of beautiful, shapely blocks, any style of face, any standard or fractional size.

Write This Very Day for Block Machinery Catalog

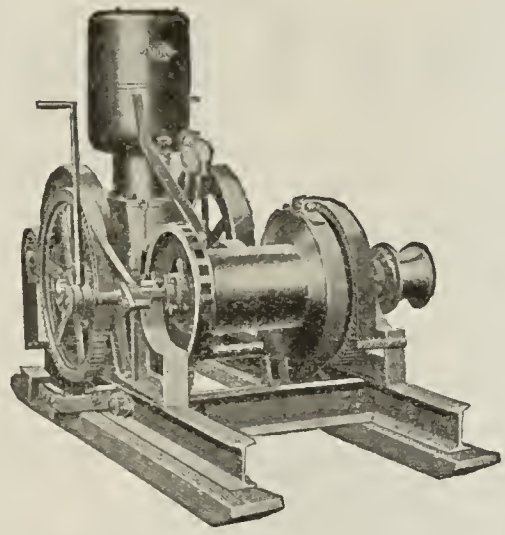
Make your own building materials with

IDEAL POWER BLOCK AND BRICK MACHINES

Use IDEAL CONCRETE MIXERS to put down Feeding Floors, Foundations or Walks.

The Ideal Concrete Machinery Co.

1318 Monmouth Street Cincinnati, Ohio



Prepare!

Labor is more plentiful and materials are lower than they have been for a couple of years.

This is going to boom early spring building.

The contractor who is ready to start with plenty of equipment is the one who will profit.

Look over our catalog and make up your list. Get our prices now if nothing more.

If you do not have our catalog send for it.

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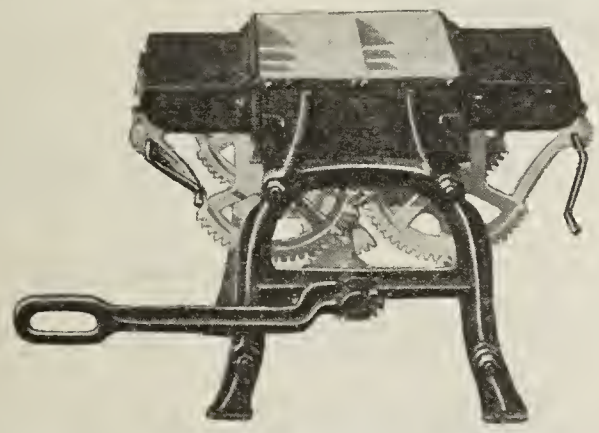
GEO·B·CARPENTER & CO.

Contractors, Mill and Railroad Supplies

440 N. Wells St. Department 38 CHICAGO



Double your daily output with

DOUBLE-SPEED

Brick and Block Machines

Now is the time to increase the capacity of your block plant—turn out the maximum number of wall feet per day, while the demand for building materials is at its highest.

Block Output

Our Double-Speed Block Machine makes in each operation: 2 hollow blocks, 2 silo blocks, 2 solid blocks, 2 slabs, 4 half blocks, 2 water table slabs, 2 return ends, 2 chimney blocks, or 2 porch pier blocks.

Brick Output

Double-Speed Brick Machine makes 16 brick at each operation, 8 brick being delivered at each side of the machine.

Double Speed Tamper

This power tamper gives our block machine a capacity of 1,500 blocks per day and speeds the brick machine up to 15,000 brick per day. Roller-cut-off removes surplus material from mold box and finishes the top of the product. The block and brick are tamped rapidly and vigorously, resulting in a dense, strong product. Machine consumes little power and is practically fool-proof.

Write for block and brick machinery catalog, Dept. A,

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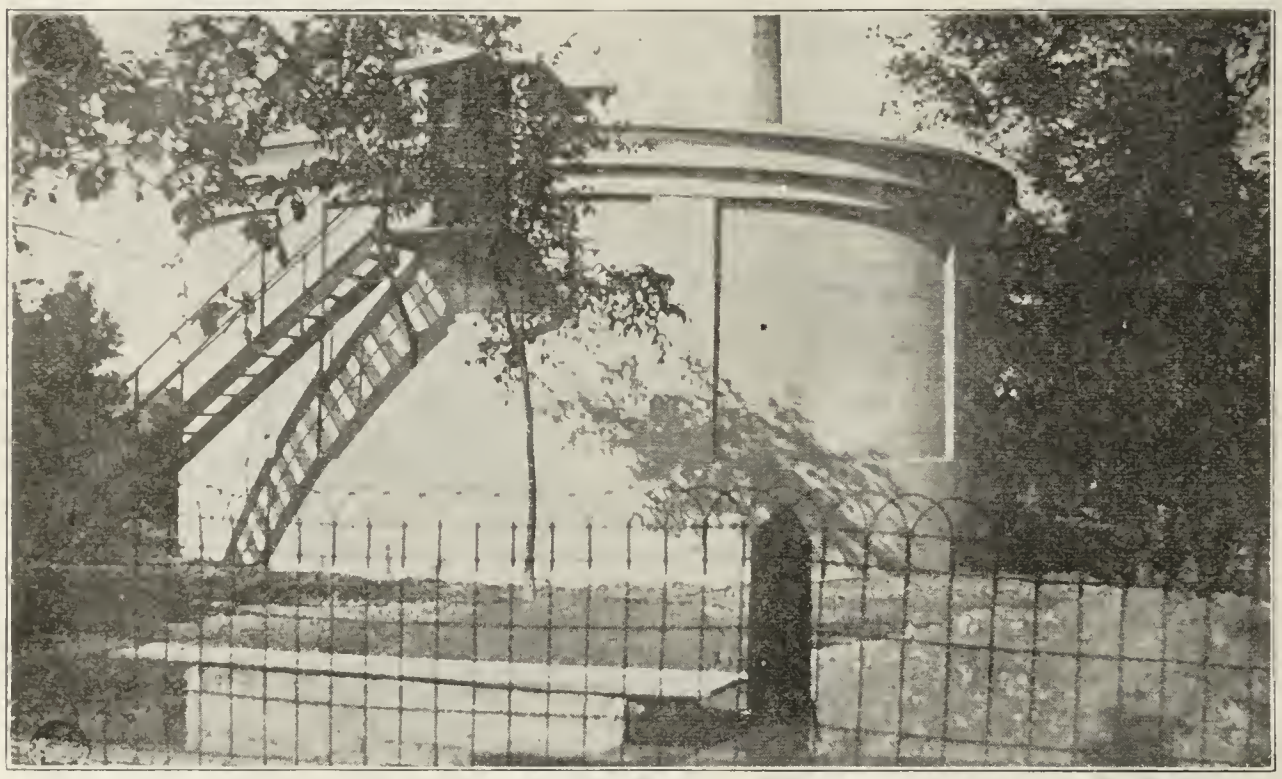
HYDRATED LIME
FOR Superior Quality Concrete
In Roadways, Bridges, Culverts, Sidewalks, Gutters, Curbs, Retaining Walls

Recent investigations and experiments by prominent highway engineers have led them to recognize in HYDRATED LIME an effective, safe and suitable material which may be used as an admixture with concrete to obtain a degree of permanency in concrete road construction not heretofore realized.



View of the concrete reservoir erected by the City of New Ulm, Minn.

The floor, walls and roof are of a 1-2-4 mixture, with addition of 5 per cent hydrated lime. After the removal of the forms, a 1-2 mixture of cement mortar, including 10 per cent hydrated lime and 3 per cent cement waterproofing, was applied to both inside and outside walls as a finishing coat, about ½ inch thick.

Hydrated Lime in Concrete Roads

It Facilitates the Handling and Placing of the Concrete and Is Productive of the Following Results:

1—Increases the plasticity and homogeneity of the mass, causing the concrete to flow more readily into place, and increasing the covering capacity and spreading qualities of the cement.

2—Reduces to a minimum the tendency towards segregation.

3—Causes the retention of a sufficient amount of moisture in the concrete while setting to aid further hydration of the cement and to reduce the risk of shrinkage cracking.

4—Being a void preventative, it renders the slab less porous and more impermeable, largely reducing the alternate absorption and expulsion of moisture, thereby minimizing expansion, contraction, internal stresses, and cracking, which arise mostly from changes in moisture content.

5—Produces density and uniformity in the finished concrete, thereby adding to the life and efficiency of the road by elimination of stone pockets and other sources of irregularity in strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

Marblehead Lime Co., Chicago—Kansas City

Ste. Genevieve Lime Co., St. Louis, Mo.

National Lime & Stone Co., Carey, Ohio

Merion Lime & Stone Co., Norristown, Pa.

Lee Lime Co., Lee, Mass.

Rockland&RockportLimeCorp. New York—Rockland, Maine—Boston

Ohio Hydrate & Supply Co., Woodville, Ohio

American Lime & Stone Co., Tyrone, Pa.

White Marble Lime Co., Manistique, Mich.

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

John D. Owens & Son Co., Owens, Ohio.

Vermarco Lime Co., West Rutland, Vt.

Glencoe Lime & Cement Co., St. Louis, Mo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

Woodville Lime Products Co., Toledo, Ohio

Western Lime & Cement Co., Milwaukee, Wis.

Hunkins-Willis Lime & Cement Co., St. Louis, Mo.

Riverton Lime Co., Riverton, Va.

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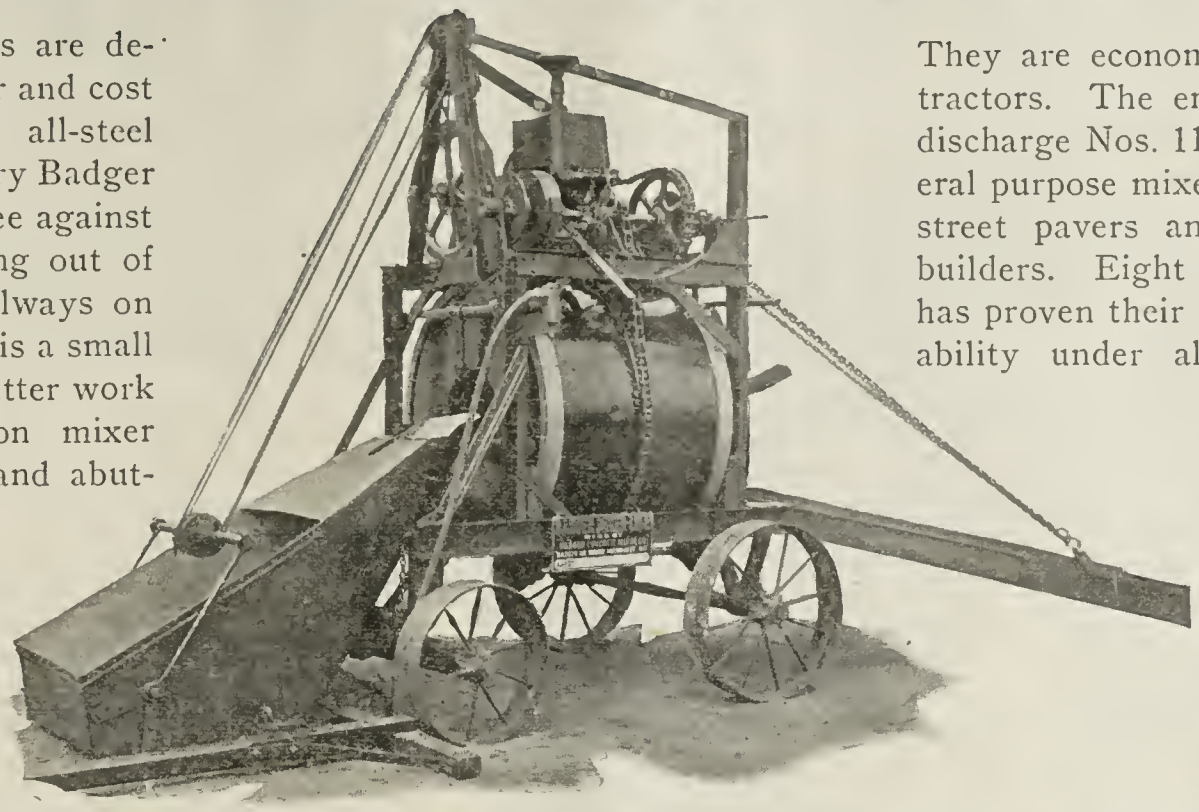
The Badger Mixers are designed to save labor and cost of operation. The all-steel construction of every Badger Mixer is a guarantee against breakage or wearing out of parts. They are always on the job, whether it is a small mixer on curb or gutter work or the construction mixer upon foundations and abutments or the alley and street paver. Their light weight and durability has made a distinctive reputation for the Badger Mixer.

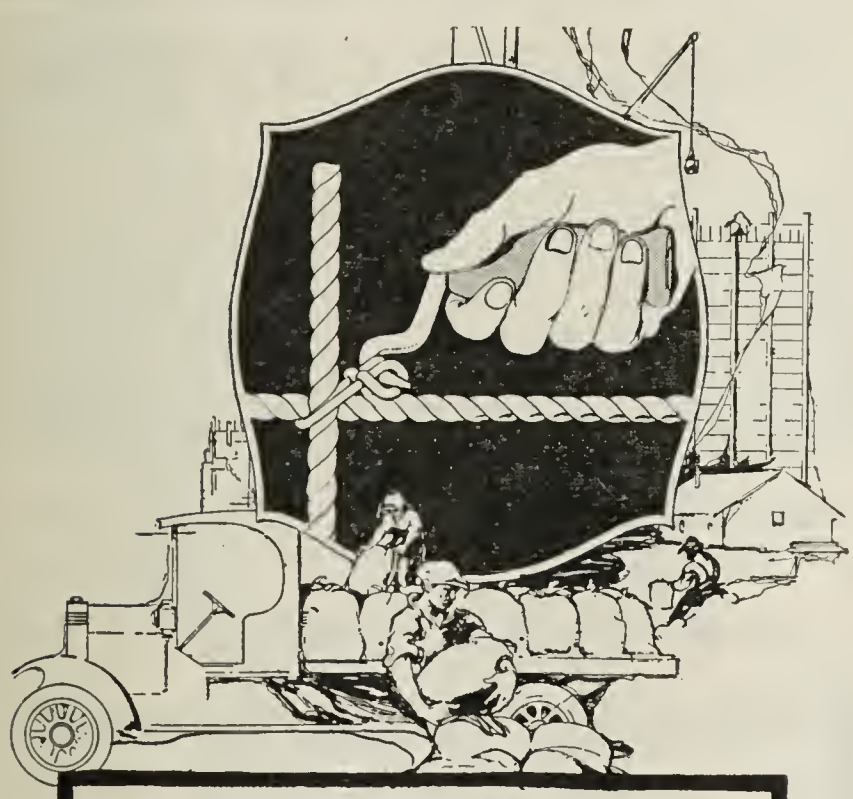


They are economical to the contractors. The end load and end discharge Nos. 11 and 15 are general purpose mixers and alley and street pavers and country road builders. Eight years of service has proven their absolute dependability under all conditions of concrete work.

Write for our attractive prices.

The ~ Badger ~ Mixer Line

BADGER CONCRETE MIXER CO., 13th Floor MAJESTIC BLDG. **MILWAUKEE, WIS.**



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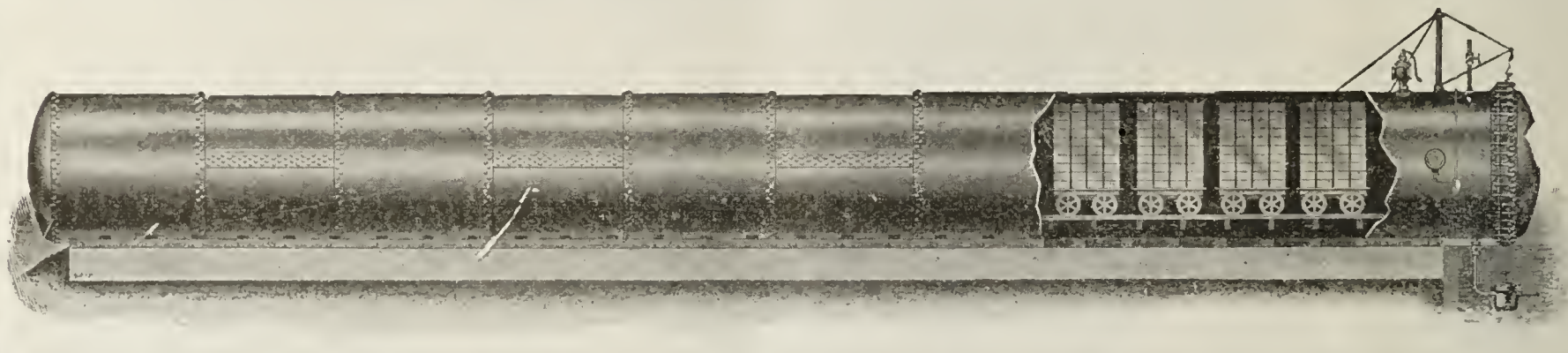

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will keep your vertical pulverizers in steady operation, because

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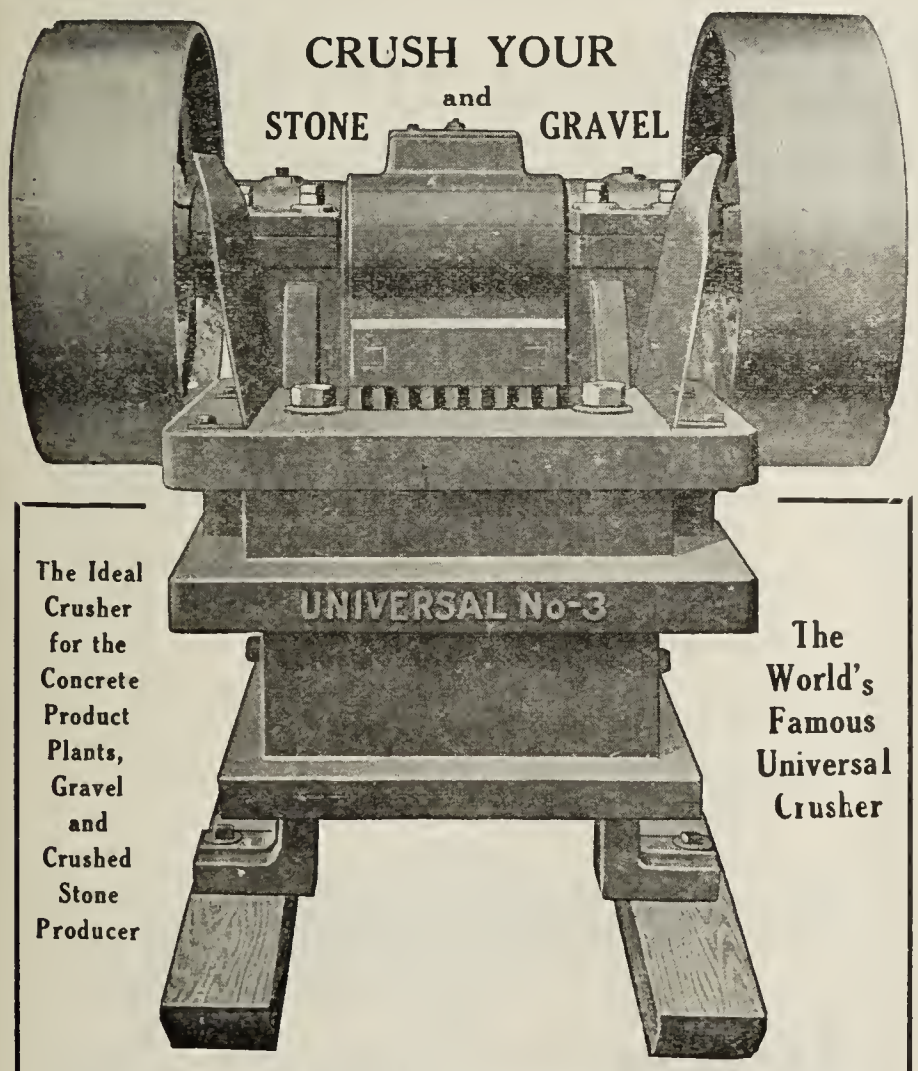

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Three grades: open hearth steel (new billet stock), "medium" and "hard" grade, and rail carbon steel (re-rolled). Both theory and practice agree on the design. Rounded corners prevent splitting of the concrete. Bending, fabricating and setting are easily done with these bars.

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Size over all 1′1″ wide, 3′0″ long, 34′0″ high, bucket size 5″x3½″, spaced 24″ o. c., chain lift, self-supporting.

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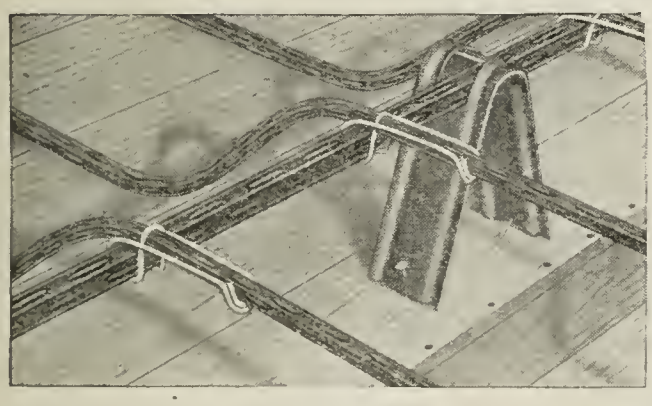
The secret of added strength in concrete structures is obtained by using HAVEMEYER BARS and this added strength is insured by properly placing and securing the reinforcement with



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For supporting head rods over column heads and for over direct bands in flat slab and bent bars over beams in beam and girder construction.

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Concrete Steel Co.
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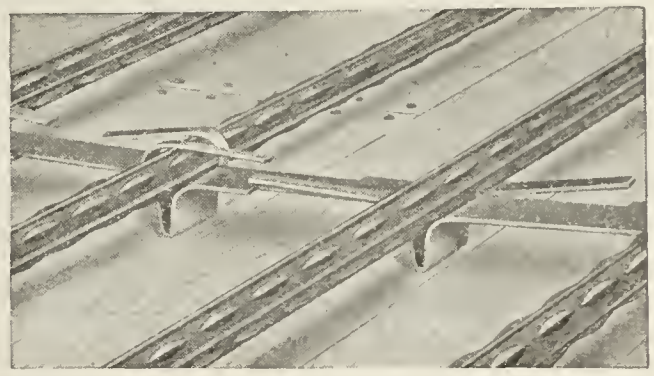

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For supporting and spacing bars in the slab.

Contractors can't afford to be without

The Waterloo Bar Bending Machine

It's made in 2 sizes, and is guaranteed to bend bars as follows: No. 2 bends cold reinforcing bars including 1⅛ in. round or square. Price $30.00. No. 3 bends cold reinforcing bars including 1¼-in. round or square. Price $35.00.

Bends bars to various angles desired. Has a detachable handle 7 feet long for convenience in handling.

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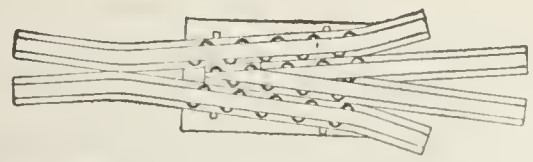

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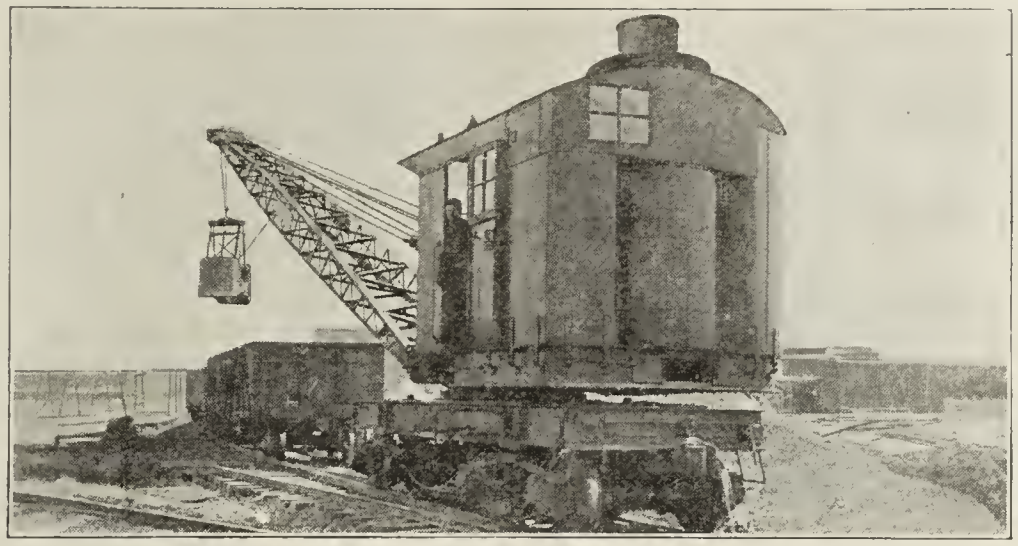

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Several 36-in. Gauge, also 24-in. Gauge Saddle Tank Locomotives for **Prompt Shipment.**

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RAILROAD AND CONSTRUCTION CARS, ALL TYPES

Flat, Box, Gondola, Ore, Dump Cars, Interurban Cars, Passenger Coaches, etc.

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If you are needing more track BUY NOW. There is a SCARCITY.

We own and offer the following NEW RAILS for prompt shipment:

12-lb. rails, angle bars, bolts and nuts.
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Concrete Mixers: Two Ransome ¾-yd., mounted for standard track; water-measuring tank; G. E. motor, 15 H. P., 220-volt, A. C., 60-cycle, 3-phase.
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2000 tons 80 lb. Rail, A.S.C.E. Section.
1000 tons 25 lb. Rail.
3 2-6-0 Locomotives.
36 Storage Battery Locomotives, 36-in. gauge.
5 Dinky Engines.
10000 Steel Cots, single and double deck.
30000 Mattresses, single and three-quarters.
New and second hand Tools, all kinds.
Thousands of other articles.

Wire or write for complete lists; our prices are lowest.

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Jacksonville, Tenn.

SPECIAL BARGAINS

For Immediate Shipment

1—18-B Bucyrus, traction, revolving, steam shovel.
1—55-ton Baldwin Consolidation locomotive.
1—35-ton Pittsburgh, saddle tank locomotive. Std. ga.
1—15-ton Derrick Car, standard gauge, full M. C. B.
1—10-ton O. & S. 8-wheel locomotive crane.
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40—50,000 lbs. capacity flat cars, standard ga.
1—7½ McCully gyratory crusher.
1—10x22 Acme jaw crusher, complete plant.
10—4-yd., 2-way dump, 36-in. ga., Continental cars.
1—18-in. Symons disc crusher.

Also a large number of other shovels, locomotives, cars, rail, hoists, cranes, crushers, dryers, screens, elevators, conveyors, pumps, engines, etc.

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Tribune Bldg. New York

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40 Tube-Cottrell Precipitator Apparatus—15 K V A Capacity. Complete in all respects and in first class condition.

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Kansas City, Mo.

WANTED

Experienced quarry foreman. Three Forks Portland Cement Co. Trident, Mont.

WANTED

A man thoroughly familiar with the manufacture of cement blocks and bricks, to take charge of a new plant in a fast growing town, one able to invest $500.00, good references required.

Address Box 247, c/o Cement & Engineering News, 22 Quincy St., Chicago.

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7 ton—42-inch gauge
4 cylinder 35 H. P. Engine
Recently overhauled and in good condition. Price.....$1,500
Value very much greater.
Location: Crystal City, Missouri.

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1—45-H. P. Charter Gas Engine Friction Clutch.

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all weights and sections

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500	Tons	40-lb.	Relay	1000	Tons	75-lb.	Relay
500	Tons	56-lb.	Relay	200	Tons	80-lb.	Relay
500	Tons	60-lb.	Relay	1000	Tons	85-lb.	NEW
300	Tons	70-lb.	Relay	1000	Tons	90-lb.	NEW

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One 36x60 Jaw Crusher, or larger. One No. 18 Style K Gyratory Crusher, or approximately its equivalent. Give full particulars and state lowest cash price in first letter.

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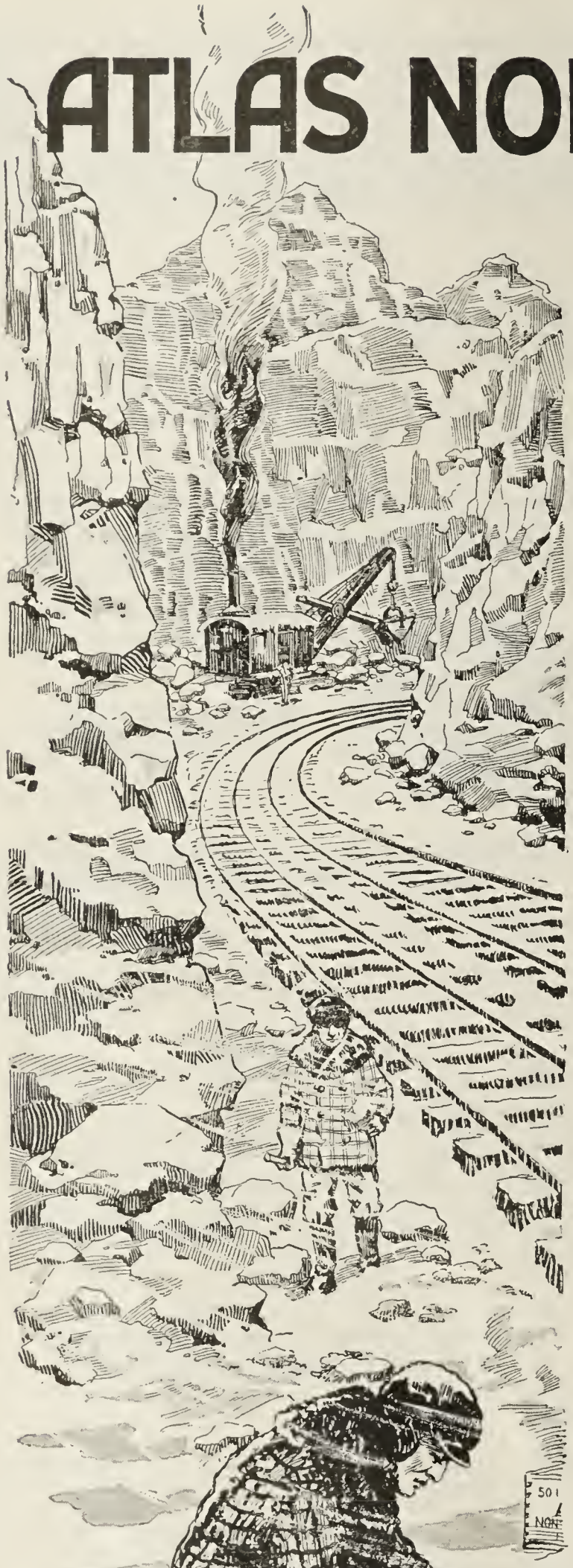

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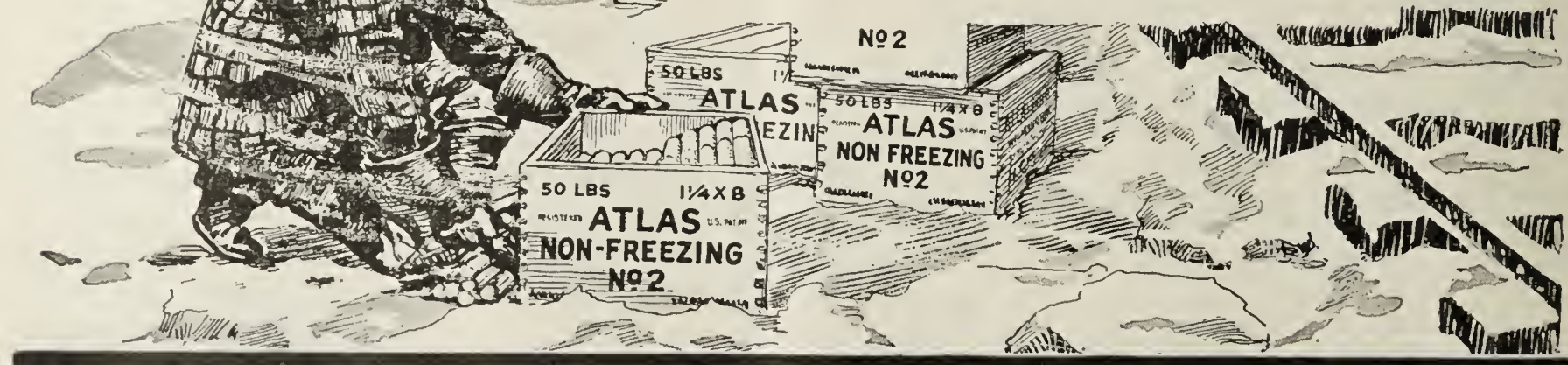

NO thawing — NO headaches — NO objectionable fumes

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The Jeffrey

Single Roll Crusher

Reduces Run-of-Mine or Lump Coal to Stoker Size in a Single Operation

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Patented

CEMENT AND ENGINEERING NEWS

with which Gravel & Stone Magazine is Incorporated

22 Quincy Street, Chicago.

(PUBLISHED MONTHLY)

William Seafert, *Publisher and Editor*

J. F. Waldron, *Advertising Manager*

R. M. McCully, *Business Manager*

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Advertising copy or changes in ads. must be in this office by the 25th of each month, as hereafter our magazine will appear on the 5th of the following month

Advertising Rates Sent on Application

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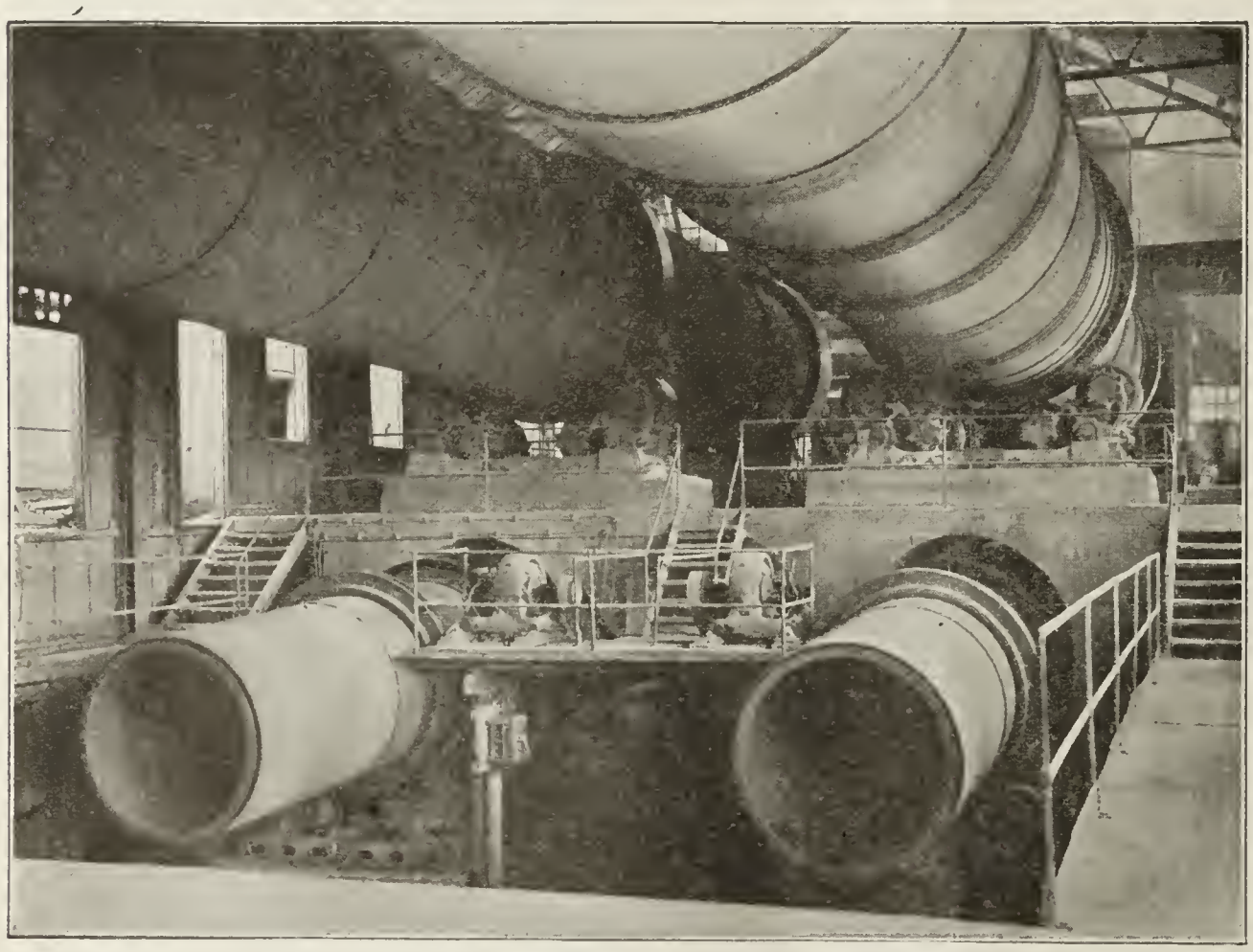

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FOR MODERN CEMENT PLANTS

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First Class Silex Slabs

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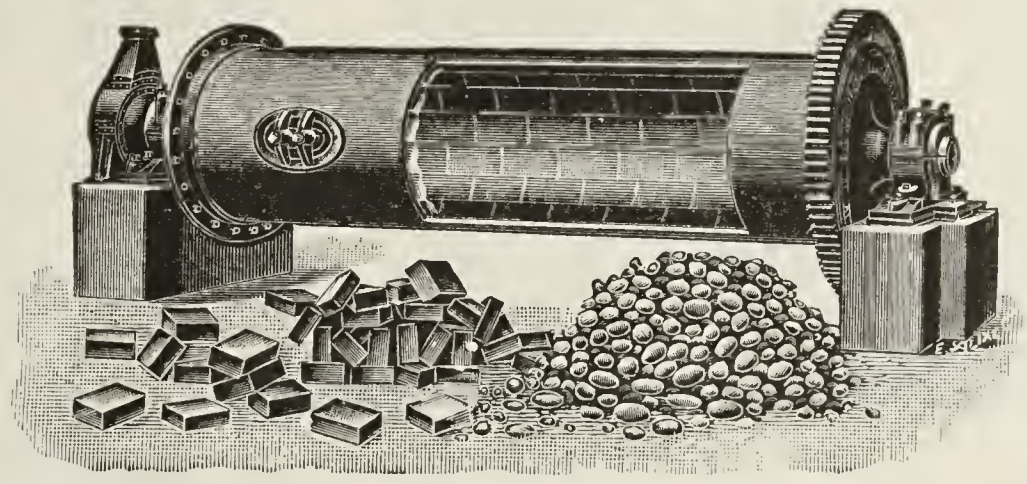
Have successfully passed some of the most severe tests. Long life and moderate price. Immediate shipment on stock sizes. Write for prices.

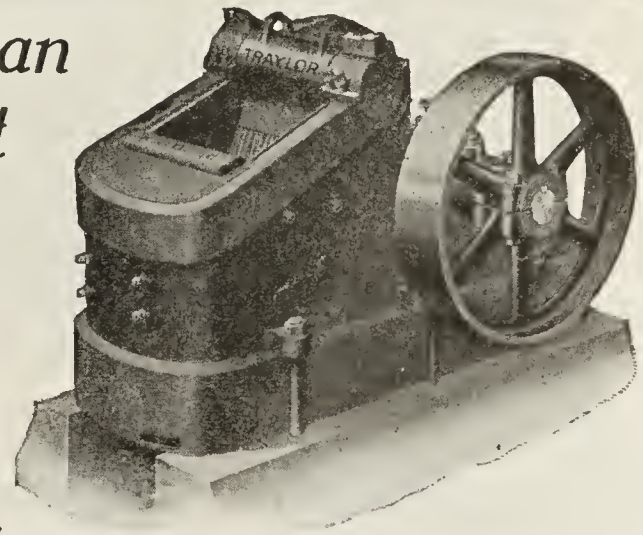


Societe Generale Meuliere

La-Ferte-sous-Jouarre (S-&-M)

(France)

Traylor "Bulldog" Jaw Crushers Mean a Saving at Any Crushed Stone Plant



One method of designing crushers is to make them so massive throughout that it is practically impossible for them to be subjected to strain. Yes, they crush but the cost of operation is terrific.

Traylor Engineers strove to design the lightest yet the strongest crusher possible, that's why the frame of every "Bulldog" Jaw Crusher has a steel band shrunk on it top and bottom and all are equipped with the "Bulldog" Toggle system, the pitman of which is by far the lightest yet strongest of its kind being; made of wrought-steel tension members.

And it's this fine balance of weight and strength that makes the "Bulldog" crusher so economical to the user. Ask your neighbors about the power costs of their "Bulldog" Crushers.

TRAYLOR ENGINEERING & MFG. COMPANY, Allentown, Pa.

New York *Chicago* *Pittsburgh* *Los Angeles* *Spokane*

Truck and Tractor Division, Cornwells, Bucks Co., Pa.

For Immediate Delivery

10 in. x 20 in. Type "A" Jaw Crusher
14 in. "Bulldog" Gyratory Crusher
No. 7½ Gyratory Crusher
36 in. x 16 in. Type "A" Crushing Roll

And the Same Economy That's Found in Traylor "Bulldog" Crushers is Built in Traylor Motor Trucks and All Purpose Tractors

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VALVE BAGS
INSURE SAFE DELIVERY

If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

THE VALVE BAG CO. OF AMERICA
TOLEDO, OHIO

AJAX Belting

For the Efficient and Economical Conveying of Sand, Gravel, Crushed Stone, Cement, Clinker, and Coal

Your plant is a success, of course. You have made it such by devoting your energies to it, by carefully studying out every possible way to increase its efficiency and economy of operation. It represents and reflects your personality.

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The reasons are evident. Fifty years experience in good belt making, proper materials and the most modern equipment are bound to give RESULTS.

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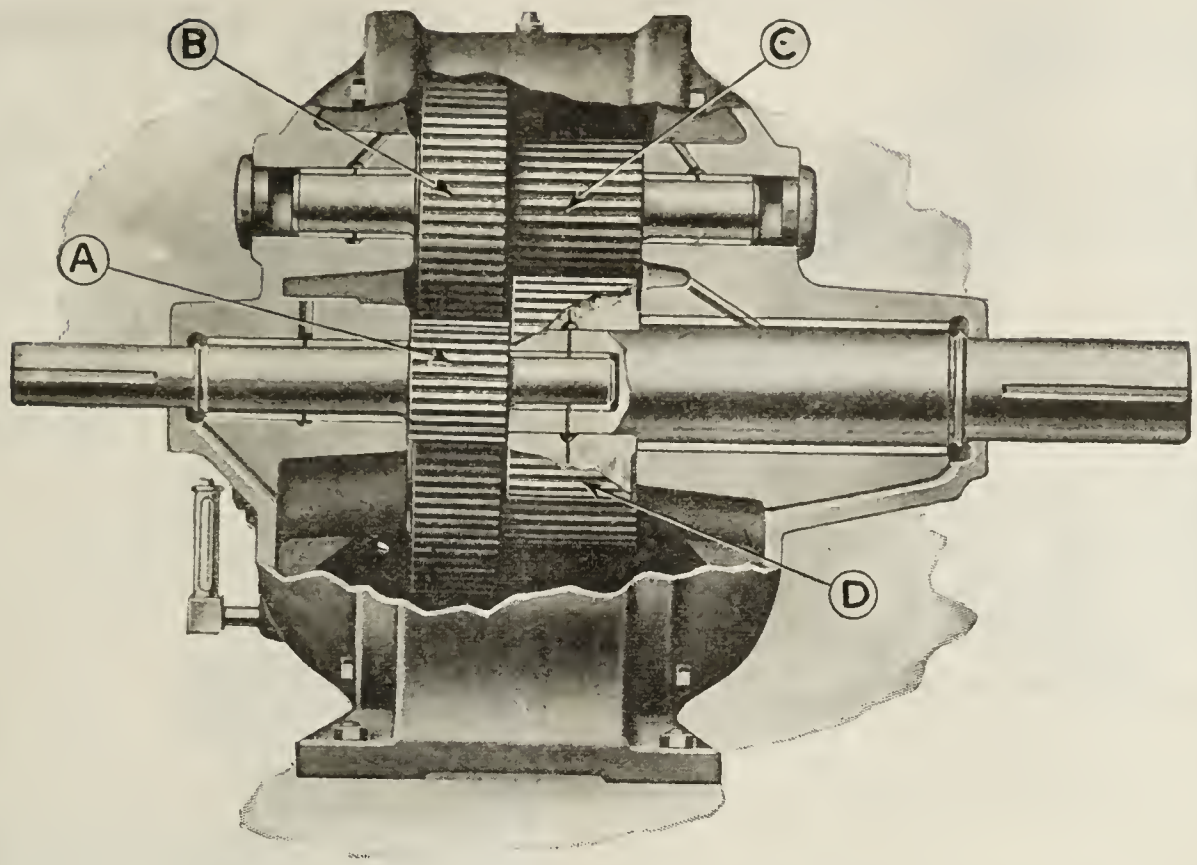
NEW YORK BOSTON PHILADELPHIA SAN FRANCISCO



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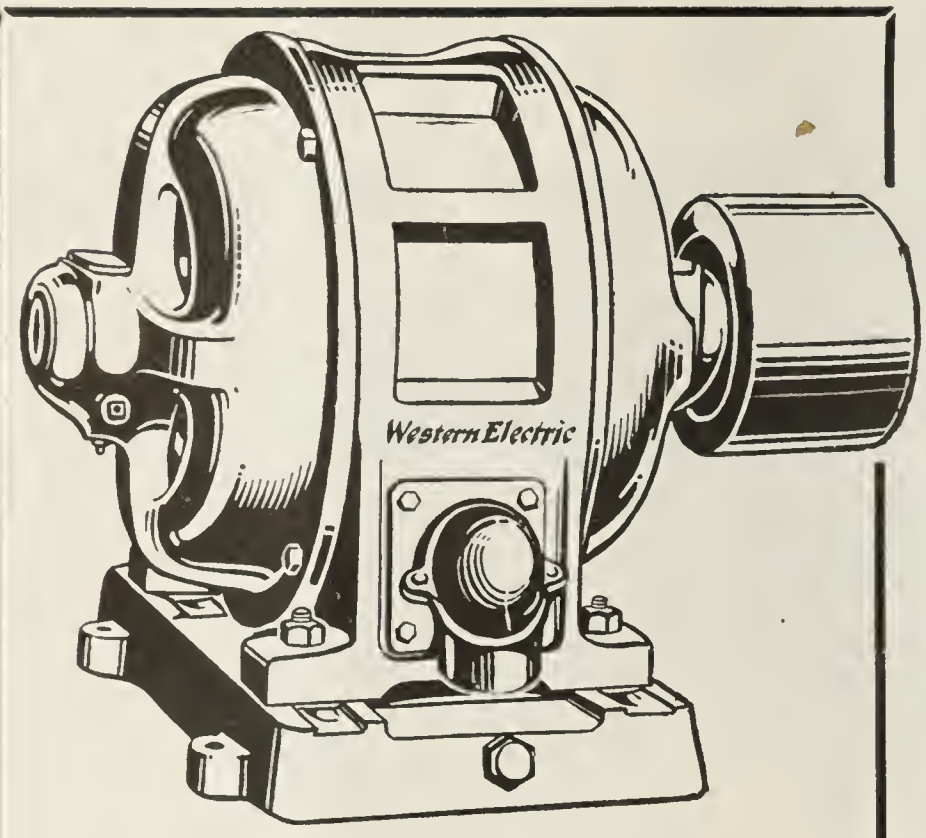
Jones

Engineers in the Transmission of Power



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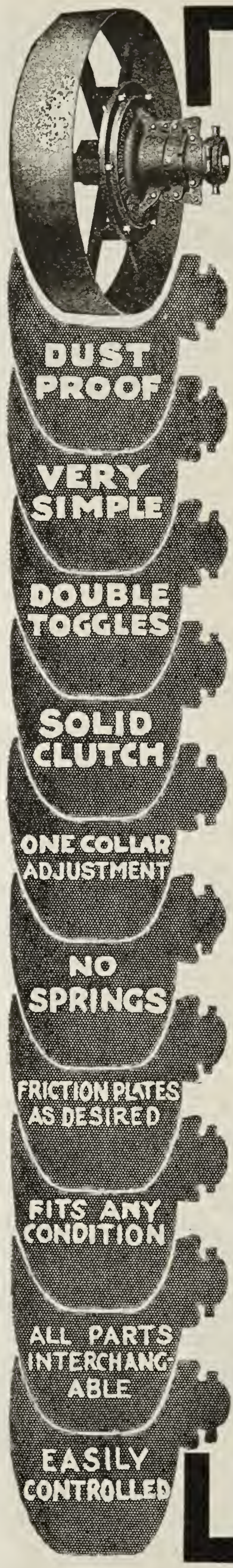
An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States.

Lansing Electric Engineering Co.

All the Name Implies

Lansing, Michigan



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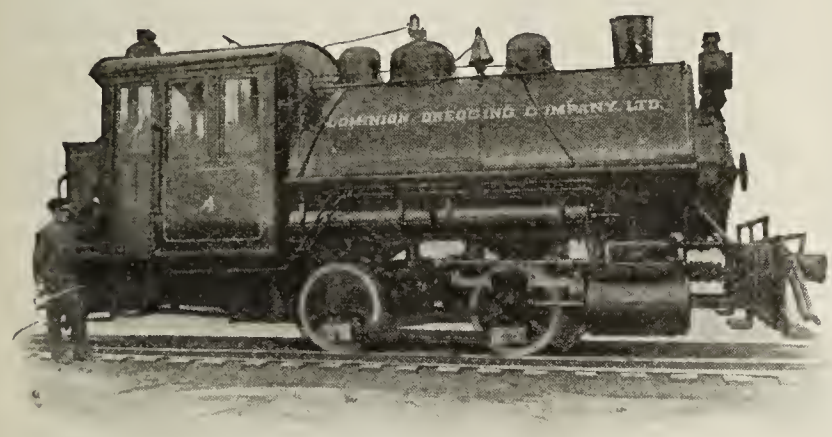

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Contractors have no trouble in coming out "on top" when Vulcan Locomotives are used.

Not only are you sure of avoiding loss due to haulage delays, but the reserve power and the design of Vulcan Locomotives enable you to improve on your estimated haulage time.

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Bevel and Worm
Steel and Rawhide

Accuracy and Prompt Delivery

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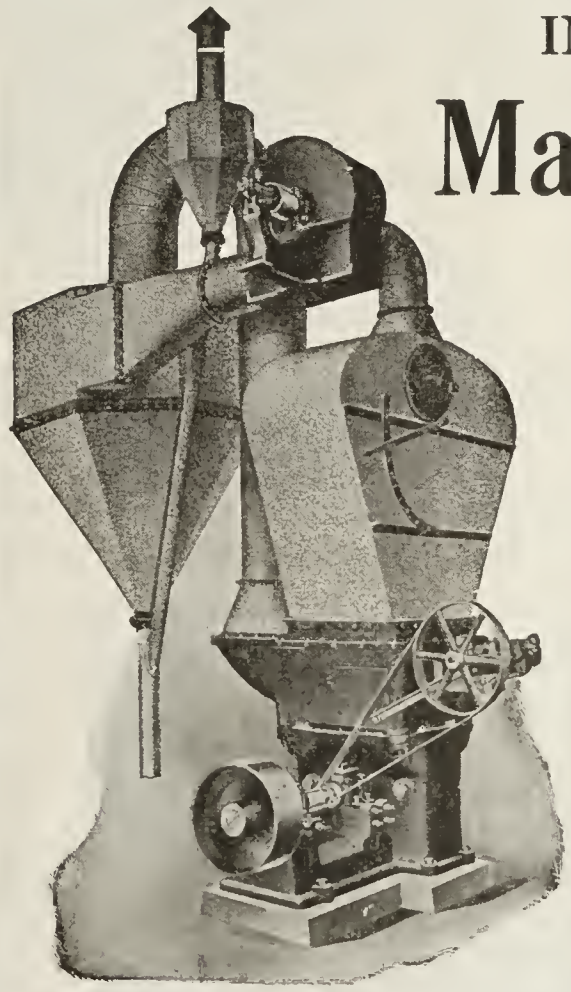

In successful use grinding Cement, Clinker, Limestone, Coal

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NO DUST

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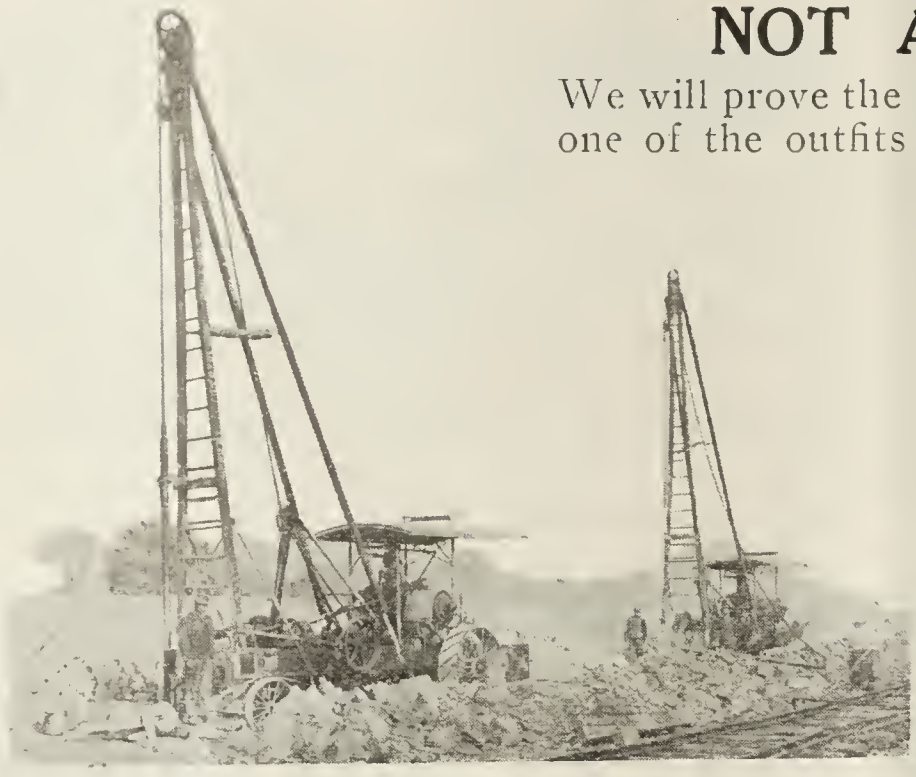
CANTON, OHIO

THE BEST BLAST-HOLE DRILL ON EARTH

THE CYCLONE No. 14



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Furnished in Steam, Gasoline, Compressed Air or Electric Power, Traction or Non-Traction.

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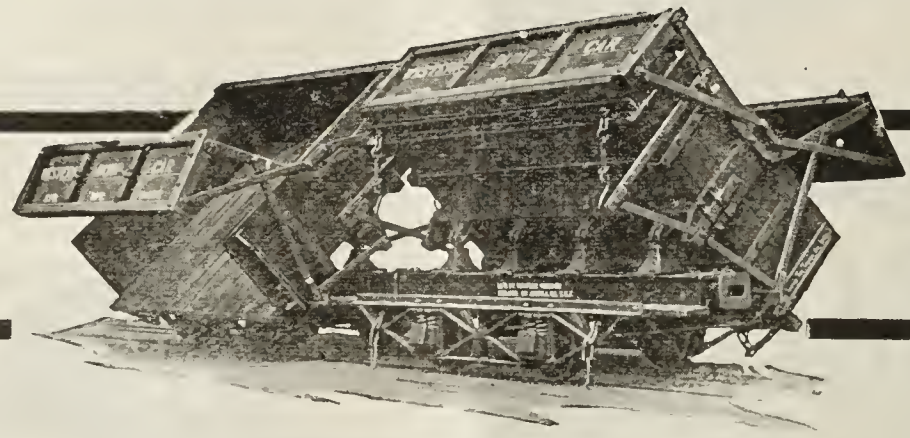
Western



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Western Dump Cars have won their reputation through years of faithful performance in many of America's largest manufacturing and construction plants.

Their efficiency is the result of expert workmanship, the finest materials and our unusual knowledge and experience in Dump Car building.

It will pay you to get acquainted with Western Dump Cars. Write for full particulars today.

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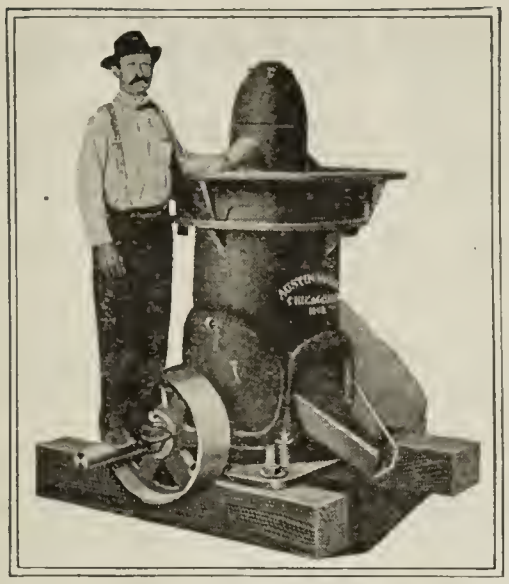
AURORA, ILL.



Austin Gyratory Crusher

Here is a crusher which possesses, in addition to every standard feature of construction, six big exclusive points of advantage.

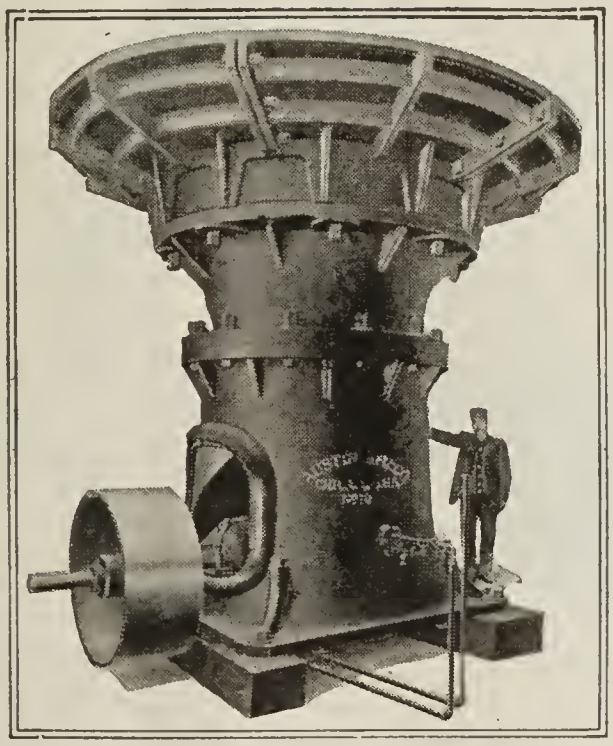
It is the only crusher with these points. Mark them well:

1. Automatic oiling system.
2. Rigid eccentric bearing in main frame.
3. Size of rock receiving aperture constant—even after adjustments for wear.
4. Counter-shaft supported on each side of driving pinion.
5. Full eccentric bearing surface retained, even when head is raised.
6. Working parts thoroughly protected from dust and dirt.

These features explain the success stone producers have with Austin Equipment.

Austin Gyratory Crushers are made in eight sizes with an hourly capacity of from five to five hundred tons.

Catalog No. 28 giving full particulars of this and other crushing apparatus, bins, screens, elevators, etc., on request.



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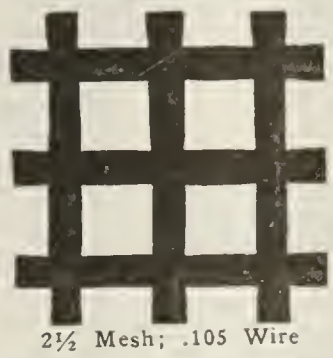
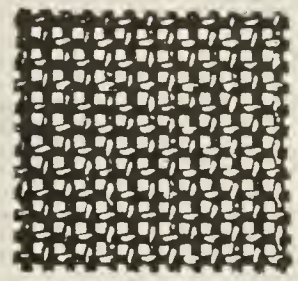
Canadian Agents: Mussens Limited, Montreal, Toronto, Winnipeg, Vancouver.

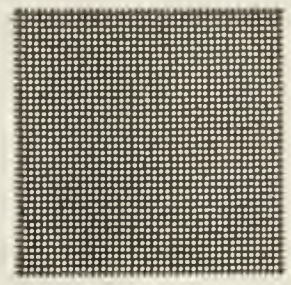
Cleveland Double Crimped WIRE CLOTH



2½ Mesh; .105 Wire



12 Mesh; .047 Wire



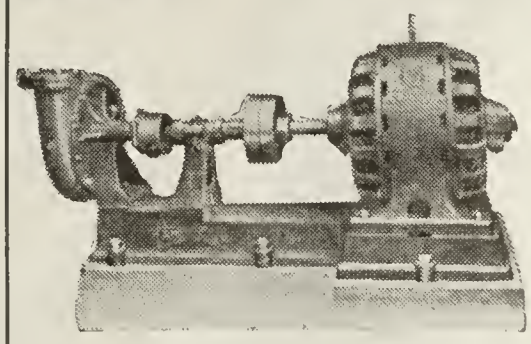
40 Mesh, .0135 Wire

You should use our screens because a uniform fineness of screened product is assured by an even, accurate mesh. This is a characteristic of "Cleveland" Double Crimped Wire Cloth.
Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

The Cleveland Wire Cloth & Mfg. Co.
3579 E. 78th Street, CLEVELAND, OHIO

AMERICAN
TRADE MARK REG'D. U.S. PAT. OFFICE

PUMPS



Built to Meet All Possible Power Plant Requirements

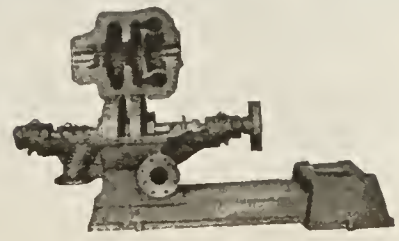
Fifty standard types of centrifugal pumps regularly built and special designs as wanted.

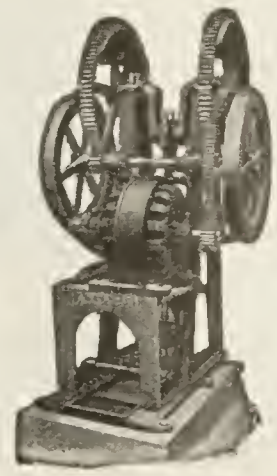
Also a complete line of deep well plunger pumps.

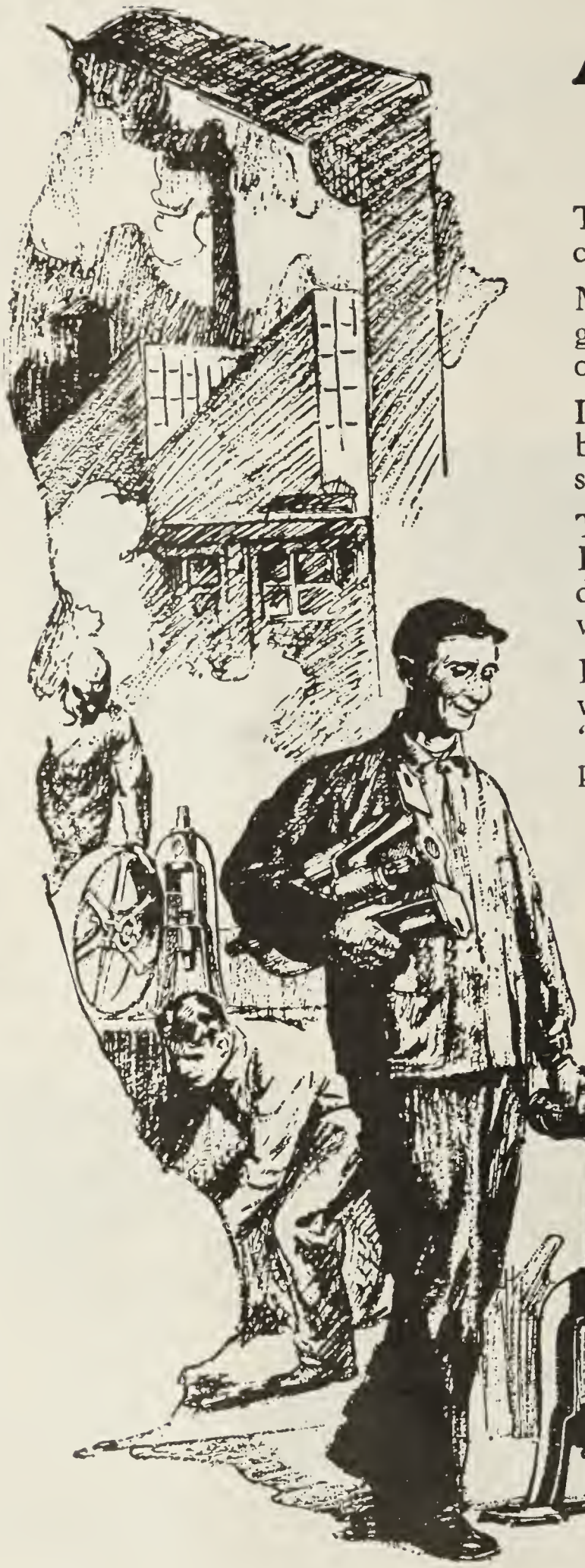
Write for Catalogs.

The American Well Works

General Offices and Works: Aurora, Ill.
Chicago Office: First National Bank Bldg.







Are you re-arranging your shop conditions?

Take the Dodge, Oneida and Keystone dealer into your confidence; tell him what you want to accomplish.

Maybe it is lower cost of production; or, perhaps, greater production! Again, it may be individualization of machines or groups of machines.

In any event, he can help you! And the change to better conditions will not be delayed while costly special equipment is being built and fitted.

Thousands of far-sighted superintendents have taken Dodge dealers into their shops and into their confidence; knowing that sooner or later these dealers would pay big dividends upon their acquaintance.

Don't jeopardize the output and profits of your factory with inferior power transmission products; make "Dodge" your shop standard and retain the inherent simplicity, reliability and safety of mechanical equipment.

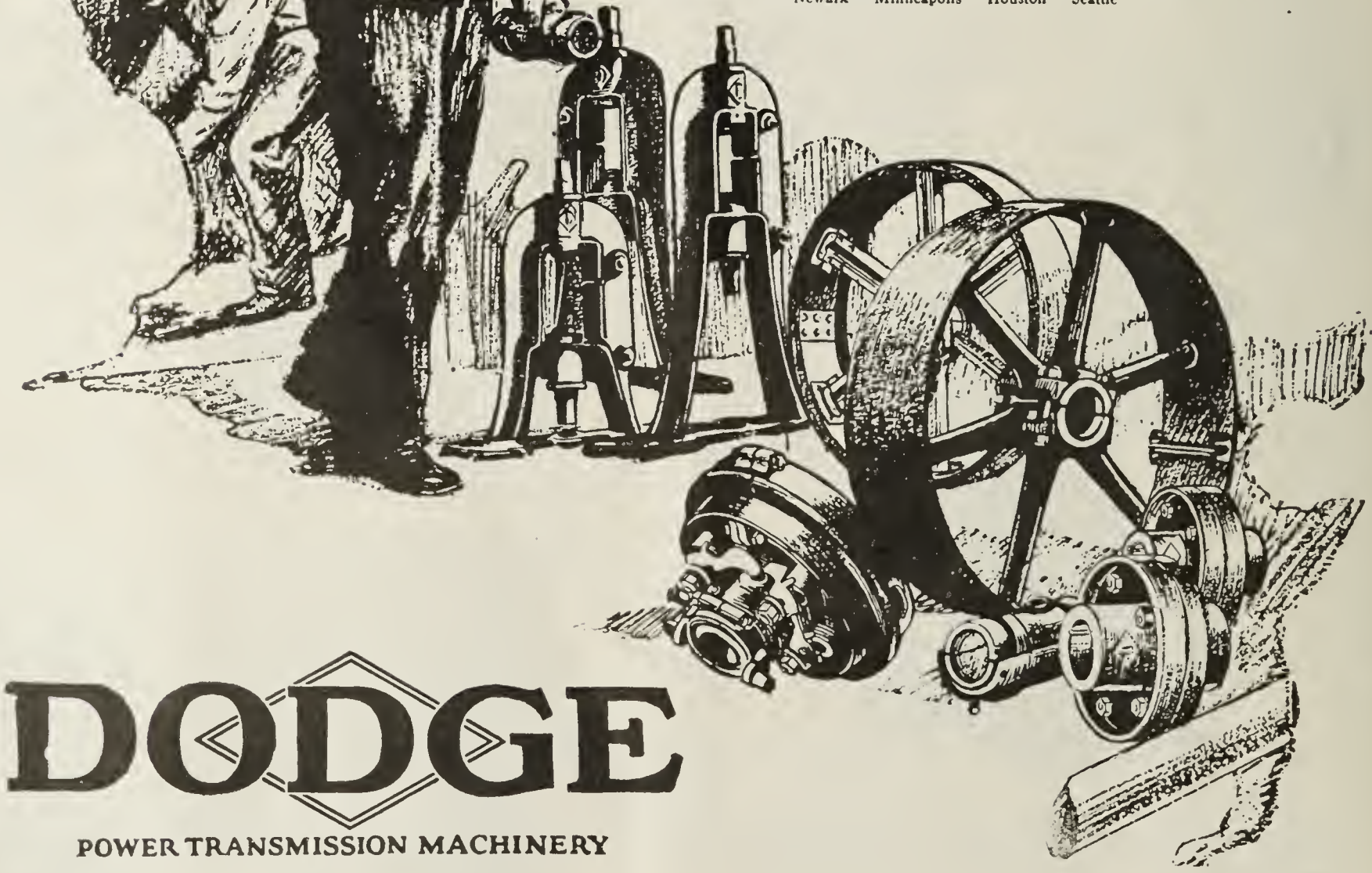
Dodge, Oneida and Keystone products are carried in stock by local mill supply dealers; the pulleys, hangers, bearings, etc., that are necessary for the re-arrangement or expansion of your facilities, will be sold on the *immediate delivery basis*.

Dodge Sales and Engineering Company

Mishawaka, Indiana and Oneida, New York

Canadian Manufacturers, Dodge Mfg. Co. of Canada Ltd., Toronto and Montreal

Chicago St. Louis Atlanta Philadelphia Pittsburgh Boston Cincinnati New York Newark Minneapolis Houston Seattle



DODGE

POWER TRANSMISSION MACHINERY

Cement and Engineering News

Vol. 33 Chicago, April, 1921 No. 4

More and more, among forward-looking real estate and building companies, one sees the tendency to put the stamp of originality and character into dwellings built in groups or in the same locality. Time was—not so long ago, either—when such homes, while serviceable and practical, seemed to all have been "ground out of the same mill."

These homes are the work of the Jose-Balz Realty Company of Indianapolis, and were built under the direction of the Company's Building Superintendent, Mr. Stokesbury. In their order from top to bottom, brief specifications of the work are as follows:

Background of Bishopric board, covered with 2″ mesh poultry netting.

Background of wood lath lurred over lining, wood lath covered with 2″ poultry netting well stapled.

Background Bishopric board covered with 2″ poultry netting.

All of these residences received scratch and brown mortar coat in which Medusa Waterproofed White Cement was used—mixed under the supervision of Mr. Stokesbury. The usual precaution of wetting down cratch coat and brown coat, was taken, and the job lay in a curing state for ten days before the finish coat was applied.

The finish coat on all four is Medusa White Waterproofed Cement. Machine mixed white marble dash manufactured by the Indianapolis Mortar and Fuel Company.

The Right Spirit

The Marquette Cement Company prints advertisements in the Chicago newspapers claiming that for some time it has been marketing its product without profits. It has been doing this in order to retain its efficient working organization and to aid in hastening a return to normal business conditions. Neither has the company reduced the wages of its employes. The concern believes that if other institutions will follow the plan and keep operating readjustment will come about naturally. The company has earned good profits in the past, and it expects to do so in future, but it argues that during the depressing interim it ought to be willing, for the sake of those who would suffer because of idleness, to keep its plant in operation, confident that in due time there will be gradual improvements that will bring resumption of satisfactory earnings.

The Marquette company has set an example that ought to be followed by other lines of business that have been holding back waiting for orders to come in before getting busy. A standing still policy never won a battle and it never will bring a business revival. The Marquette plant, by refusing to close down as other manufacturers had done, has sought to stem a tide that might have been harnessed in its inception had business men in this country displayed the proper courage at the critical period. Now, necessarily, recovery will be slow, but it is coming, and such qualities of faith as the Marquette company is showing will be the means of speeding the establishment of conditions throughout the nation that will bring contentment and happiness to all of the people, employer and worker alike.

More Good Roads

Although millions have been appropriated the past two years by the Federal government and various states and counties for good roads, comparatively slow progress has been made in carrying out the huge road building program planned because it has been difficult to get the labor necessary to do the work and many of the materials needed, notably cement and tar have been obtainable only in limited supply.

From present indications, labor for road work will be plentiful in 1921 and apparently road building materials will again be abundant.

All preparation should therefore be made to take advantage of favorable conditions to get a gigantic road making movement under way as soon as weather permits. With the money, men and materials available, Christmas of 1921 should see thousands of miles of new and improved roads in every part of the country.

A big road building program will serve to keep much labor employed that might probably otherwise be unemployed and on the hands of our charitable organizations.

And a system of good roads built to stand heavy traffic will enable auto trucks to handle much of the short haul freight traffic of the country, relieving the railroads of this class of business and enabling them the better to take care of the long hauls for which they are best adapted. Good roads for trucking will prevent the possibility of a future period of business paralyzing freight congestion such as was witnessed for several years during and after the war. Many experts gave it as their opinion that this freight congestion had a very important part in bringing about the high cost of living burdens under which we have struggled in recent years.

Cement Profits

"During the war the Government established a committee to determine costs of various products and to name a fair selling price to the Government, based upon those costs.

"The last price named by the Government on cement for the Lehigh Valley District was for the period of four months from September 1, 1918, to December 31, 1918, and was $1.75 per barrel. This price was determined after very careful analysis by the Government of cement costs, a representative of the Federal Trade Commission being an important member of the price-fixing committee.

"The cost of manufacturing by the Atlas Portland Cement Co.," writes John R. Morrow, its president, "was 30c a barrel higher for 1920 than on September 1, 1918 (being the time at which the Government last fixed the price); labor showing 46% increase, coal 20%, materials and supplies 23%.

"The recent official United States Geological Survey Reports, published on pages 24 and 25 of the March, 1921, issue of CEMENT AND ENGINEERING NEWS, show the average selling price in the Lehigh Valley district for the year 1920, $1.91 per barrel. Our average was below this figure. The difference, therefore, between the price set by the Government on September 1, 1918, and the average selling price for 1920 was 16c per barrel, and the difference in Atlas cost 30c per barrel.

"While these figures show much greater increase in mill cost than in selling price, our increased volume in 1920 more than offset this difference as reflected in the yearly income.

"Our average selling price today is below $1.91, the 1920 average given above.

"We are using the Lehigh Valley District because of our much larger output there. Approximately the same comparison applies to our Western plant. As we started operation of our Southern plant only in January, 1920, we can make no comparison.

"The net income of the Atlas Company (all plants) for 1920 was substantially under 10% on its capital invested, and the average for ten years was below that figure and no year higher.

"When sensational and unjust charges of profiteering are made, figures are given which do not reflect correct comparisons. The lowest selling prices in the history of the industry are given on one hand, as against the highest, and no account is taken of the increased costs above mentioned. The Atlas figures of increased costs, capital invested and earnings, given here, are correct and are certified to by Public Accountants. The Government report as to the average selling price is obviously correct.

"The percentage on capital is only on the actual money invested and not upon a replacement value which would show greatly increased values.

"There is a proper time and place to answer unjust charges. The Atlas Company expects to take advantage of that time and place to go into more detail, but believes in justice to itself and to those who purchase from it, that a few facts should be given now.

Construction in Brazil and Other South American Countries

During the last two years there has been a very decided trend toward reenforced concrete construction throughout the larger Brazilian cities, where the great bulk of South American building has been done. Brazil, more than any other of the Latin-American countries, has been experiencing a surprised building boom. The last year probably saw more building in Rio de Janeiro and Sao Paulo than in all the other South American cities combined. At the same time there was a rather liberal sprinkling of construction work under way in the other smaller cities of the republic.

Visitors to Brazilian cities generally are astonished at the massive and substantial construction of the public buildings as well as the business blocks. This not infrequently is found to prevail in the residence districts as well. In every respect Brazilian construction is a vast improvement over that of most of the other countries of South America. Chiefly it has run to stone in the past, the reason being an exceptionally fine grade of building stone at low cost and the prevalence of Portuguese stone masons of exceptional ability. The population is largely Portuguese and they are masons to the manner born.

For a time the tendency ran to steel construction and some of the most pretentious buildings, public and private, in recent years were of steel, brick and tile, but the war came along and boosted steel prices to a point where they speedily became prohibitive. Then interest turned to re-enforced concrete. Another reason for this was the rapidly mounting wages of the masons and other skilled labor necessary on both steel and stone construction.

Building methods generally are about 25 years behind American standards. Building equipment is woefully inadequate and primitive. Concrete and mortar are in most instances mixed by hand. Hoisting of materials is done by hand generally in pails, with a rope through a single sheave hung from a timber on a framework above the building. It is not infrequent to see men passing brick from hand to hand from the ground floor to the top of a building. Machinery equipment is so rare as to be a curiosity.

In the past this has been possible because of the cheapness and abundance of common labor, but the urge for higher wages is hitting South America as it has swamped the United States, though in lesser violence, and new conditions which will inevitably force extensive investments in building machinery are fast developing. Such hoists as are employed are European make and of the crudest character and of minimum efficiency. Such a hoist, with an endless chain belt to which buckets are attached, handles at the utmost 1,500 bricks an hour with an attending force of from ten to twelve men.

Sand and gravel, obtained at tidewater and brought to the Rio de Janeiro city wharves in lighters, is loaded and unloaded by hand and delivered in one-horse, two-wheeled dump carts. A dump wagon, such as is so common in America, is unknown. At Sao Paulo, an inland city, the supplies come from a river bed, but the methods of handling are the same and the expense just as great. The only stone crushing plant that even approaches the modern is in the outskirts of Sao Paulo and has never been successfully operated.

All excavations are made by hand, wheel barrows being generally used with now and then a German-made crane with tip buckets, also filled by hand, brought into play. Modern methods used several years ago in the construction by American contractors, of the plants of Armour & Company and Swift & Company were a revelation to Rio de Janeiro and Sao Paulo contractors, but even this failed to spur them to investment in up-to-date American equipment.

The fact is however that American machinery manufacturers have been surprisingly slow in attempting to develop a potential market in Brazil that is unsurpassed anywhere in Latin-America. So far as that goes the same applies to all the South American states. These interests will overlook a tremendous bet if they fail to attend the National Foreign Trade Council annual convention at Cleveland, May 4 to 7, and make the most of their offered opportunity to get into intimate touch with Latin-American conditions through the medium of the reorganized Trade Adviser Service.

For the last five years there has been a very decided increase in the amount of concrete used in Brazilian construction, and as this grows, as it inevitably must, the demand for more efficient mixing and distributing machinery will advance apace. The price of cement alone will be a big factor in this, as this material costs about twice as much in Brazil as in the United States and as concrete is mixed and handled at present the Brazilian gets a far less satisfactory result for his financial outlay than the American.

Most mixers in the South American country at present are either English or German and none of them are comparable to the standard American machines. There are practically no steam shovels, three or four in all in Brazil, and most of what there are being used are in the mining districts, while the equipment of conveyors, cranes and similar equipment, save at the docks is not worth considering. A great deal of the industrial railway trackage appears to be salvage from the German war front, but American cars and locomotives are extensively used.

Electrical power is particularly cheap in Brazil and should be an important influence in aiding the sale of American building equipment. Current for industrial and construction use can be had for from 2 to 2½ cents per kilowatt in both Rio de Janeiro and Sao Paulo. It is equally cheap in many of the smaller towns. Much of this is generated by water power, the possibilities of which have only been touched as yet.

Brazilian conditions in a general way reflect those in the Argentine, save in respect to the extensive use of stone. Argentine is not so bounteously favored in this respect. But there is the same lack of up-to-date building methods there as well. On the west coast Chile and Peru offer far less inviting prospects, and the same is true of the north coast countries. But Brazil and the Argentine offer fine opportunities to the manufacturer who can make prompt deliveries.

Zinc Gutters

In building for permanency, the use of zinc leaders, gutters, flashing, and shingles is likely to become equally as important in America as abroad. Zinc has been the universal roofing material in Europe for more than a century with a record of serviceability which extends over many years. Owing to its durability, zinc for leaders and gutters is extremely economical

Practical Improved Metal Forms

By W. C. Duerr*

With the Improved Reichert Metal Concrete Forms comes the practical use of setting up three or four courses of forms and pouring at one setting without shifting forms. With the spacing arrangement that we are using, the desired thickness of the wall can be had by just dropping a nail through the Form and the spacing iron.

The forms are locked both vertically and horizontally insuring double stability, and at the same time only three levers used to lock the forms both ways. A basement can be set up with Reichert Improved Molds in a few hours time and made in one pouring without the use of heavy lining bars so often seen on this class of work. For housing corporations the arrival of the Improved Reichert Forms is just the thing.

The Forms for both straight and circular work are made of ⅛x1¼ angles; same levers being used on all forms. Our Locking Device, not only locks the forms but at the same time keeps them in perfect alignment. Another feature by locking the forms the angles and plates are forced so tight together that the construction joint is not to be seen making it appear like one entire form, and being practically water tight. The forms are wired together, the same as the wooden false work.

The Locking Device is made of ¼-inch soft steel stamping and is placed in such a position that they are entirely out of danger of being knocked down, in fact the lever will never loosen due to its construction and never cause a loose joint, and making building of walls impossible.

For silos and circular work, the derrick with its swing arm and being portable makes it very practical on this class of construction work. In fact the Improved Reichert Form must be seen in operation to show the advantages in construction work, such as basements, warehouses, silos, grain elevators, coal packets, etc.

*Secy.-Treas. Reichert Metal Forms Co., 1188 Weil St., Milwaukee.

Great Possibilities for the Sale of Concrete Stave Units

Sure profits are awaiting concrete products manufacturers and others who are awake to the possibilities of the varied use of concrete staves. A new field, practically untouched, is offered to all in the manufacture and erection of these units for coal pockets, garages, corn cribs, grain and sand and gravel bins, water tanks, hog houses, barns, partition walls, etc. They have been the leading type of silos for some years.

Structures built of concrete staves combine permanency, economy and eliminate the constant fire hazard. Size for size, they can be built for lower costs than any other building material, writes the Pierce Co., Steger Bldg., Chicago.

It matters not if these units are not now being manufactured in your immediate territory. This means absence of competition for you. The demand for these buildings is certain. The business can be secured. Authoritative data and detailed designs can be furnished covering all types of buildings. Concrete stave structures are suitable for both town and country.

Everything in the line of silo hardware, accessories and manufacturing equipment, can be supplied promptly by the Pierce Co. Storage depots at Kansas City, Minneapolis, Pittsburgh, Chicago and London, Ohio, enable them to take care of your order on short notice.

They also maintain an engineering service, whose wide-spread experience and practical knowledge is at your disposal in planning new types of silo construction, doors, door frames, etc.—or in determining hardware needs best adapted to your particular job.

Security Anchor

An entirely new product known as Security Anchor and Wall Ty has been placed on the market by the Concrete Steel Company with offices in Monadnock Bldg., Chicago, and 42 Broadway, New York City. Not only is this product new in design and structure, but the idea and theme carried out by the article is new in thought.

The Anchor is used for bonding brick veneering, terra-cotta, stone and tile wainscoting to concrete surfaces. For holding metal lath ceilings and for securing floor screeds. nailing strips, etc.

The Anchor is manufactured from ⅝"x16 gauge hoop stock made rust proof and has self contained nailing barbs and anchor arms occurring 3" on centers. Is made in standard lengths of 8 ft. and crated in suitable units. The Wall-Tys are made from No. 9 galvanized wire, No. 1,4½" long for one course of brick and No. 2,7½" long for two courses of brick. The No. 2 Ty may also be used for terra-cotta or

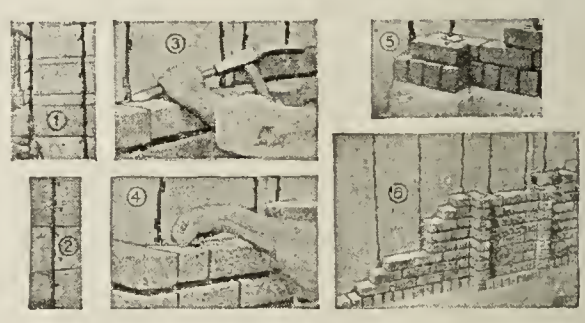


Fig. 1. Nailing the Anchor
Fig. 3. Opening the Loop
Fig 4. Placing the Tip
Fig. 6. Showing tip in position

stone. Both sizes packed in standard units of 1000 to the carton. Both the Anchor and Wall-Tys are carried in stock.

The method of application for veneering purposes is to nail the Anchor perpendicularly to the forms 12" on centers, so, that when the forms are removed, the Anchor is flush with the surface of the concrete. For brick veneer, a loop is pried out at every fourth course of brick, and a Wall-Ty hooked through forming the bond directly opposite the brick bed joint which makes the Anchor 100% efficient, as a loop may be opened at any point. The same method is used for terra-cotta and stone, only that each joint may be bonded. For tile wainscoting, every loop or every other loop may be opened to form a mortar key and the tile wainscoting placed on the scratch coat of cement.

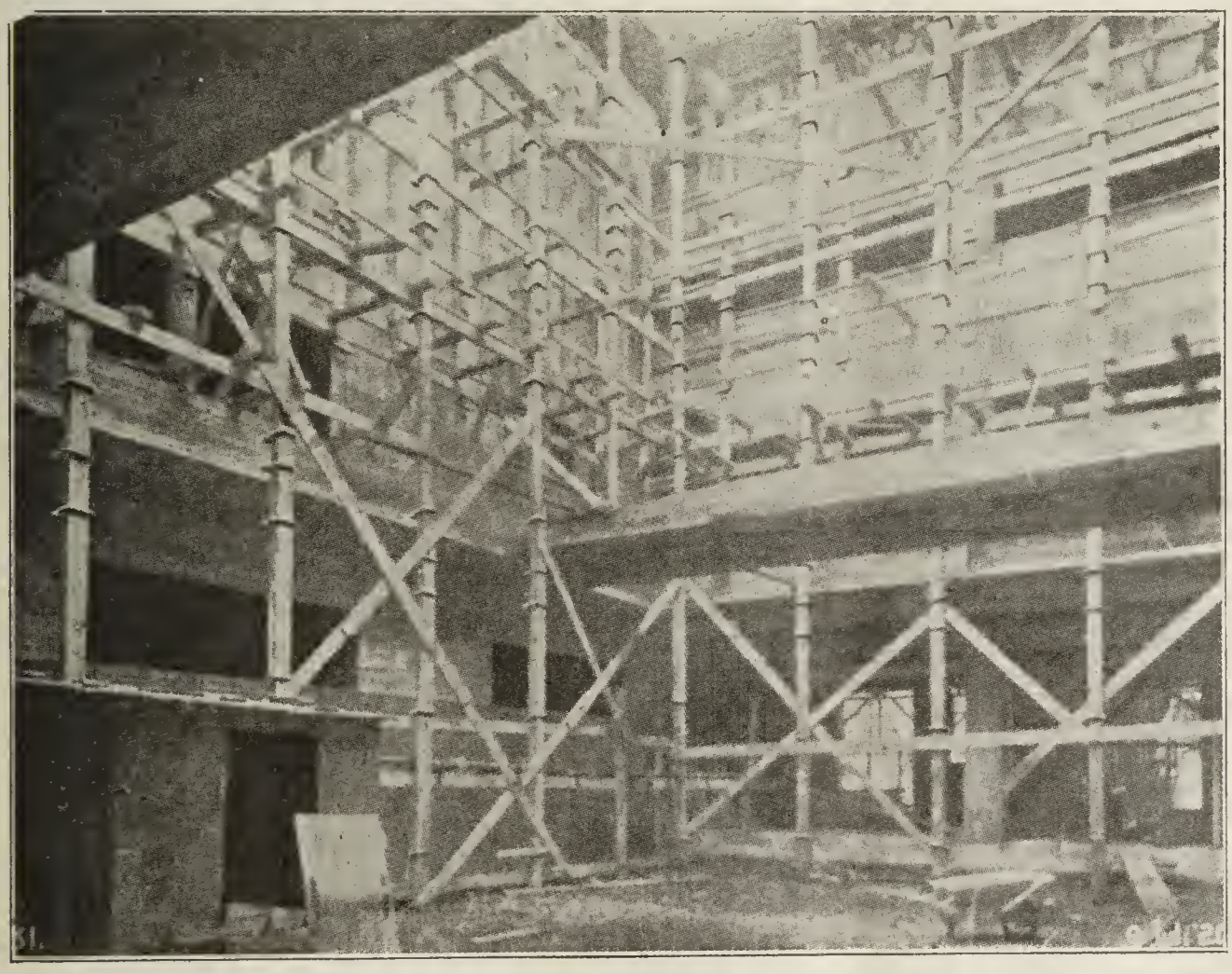
The method used for holding metal lath ceilings is to nail continuous strips of the Anchor to the forms in the bottom of the beam and, after the same fashion of brick veneer, open up a loop in the Anchor at points where the lath laps and suspend by tying with soft wire, using one ty for every 250 lb. load. For holding floor screeds, nailing strips, etc., nail the Anchor to a screed or any piece of lumber and press same into the green cement. When ready to lay the screeds,

remove the wood placing strip and lay the screed at right angle with Anchor. Pass a soft wire beneath the Anchor over the screeds and make tight. Then by driving wedges beneath the screed, bring it up to the true level. Anchors should be placed about 2 ft. apart on centers.

The accuracy and speed with which the Anchor is applied is one of its distinct features, and the perfection that it affords in bonding makes it a complete and highly efficient product.

Clamps to Avoid Cutting Timbers

Schenk's timber clamps, which have been used in Holland for a number of years, have been put on the market in this country to save cutting and the use of nails, and therefore effect economy in the timbers employed for shoring, scaffolding, and so on. They are manufactured by the Schenk's Patented Timber Clamp Co., Ltd., 2292 Larned St., E., Detroit, Mich., are made in various sizes, for use on timbers of practically any size usually employed, are simple in construction, consisting merely of a U bar with an end hook and a small plate. Their use is best shown by the accompanying illustration, Fig. 1, and by the instructions of the manufacturer, as follows:



View showing clamps being used on construction work.

Place two joists, A and B, with at least 10 in. overlap in such way that they have the required length.

Put the U form around both joists and place the lockplate (P) into the hooks (2) as shown in Fig. 2.

Use great care that the points (1) and (3) stand nearly square if the wood is thick.

If the wood is thin, the points (1) and (3) must be placed on a greater slant, as shown at (1) and (3a), Fig. 2, so that the clamp clutches the joists more tightly.

Experience in the use of the lock key will quickly indicate whether the U form has the proper slant. If the lockplate turns easily the points (1) and (3) are placed too square; when the wrench will not turn the lockplate, as indicated on the cover, the points (1) and (3) are on too great a slant.

To loosen the clamp, turn the plate in the opposite direction by means of the key, and joists are at once ready for the service at another point.

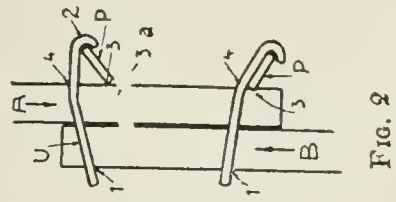


Fig. 2

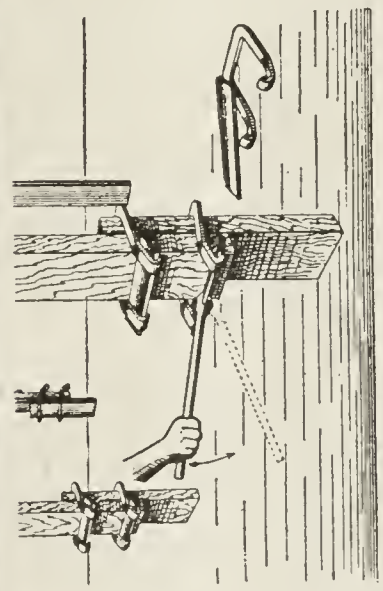


Fig. 1

Double Speed Power Tamper

Newest and Greatest Improvement

The Double Speed Tamper, made by Wood Bros. Thresher Co., Des Moines, Ia., is absolutely the most valuable piece of equipment that you can put in your plant. A complete tamping device in one unit to use with either the Block Machine or the Brick Machine enables you to tamp with power any cement products that either of these machines will make and make better Bricks and Blocks, make them faster and at less expense than they can be made with any other equipment. The Double Speed Tamper is especially made to operate over either machine with equal efficiency. It can be driven either by a 2 H. P. motor or gasoline engine and is equipped with a locking device that locks every other foot. When starting to tamp blocks the feet that work between the cores work alone, shifting a lever starts the feet that tamp on top of the cores.

This Tamper has an automatic device which removes surplus material from the machine and makes a perfect face and smooth back on every brick or block.

The Double Speed Block Machine will make 1,500 blocks in an 8-hour day—each block will stand 10,000 lbs. more crushing power than any two-core block, and weighs about 5 lbs. less, which means with 1,500 blocks per day you save 7,500 lbs. material, or 1,800 lbs. of cement. You save in cement alone $24.00 per day. Taking cement, other material and labor, your saving with the Double Speed Machinery will amount to nearly $75.00 per day.

America's Deficiency in Encouraging Progress in Scientific Art

By C. A. P. Turner, C. E., Minneapolis

In any scientific art progress is made through the discovery of new natural law and means for its ultization, or by the discovery of new means to take advantage of laws already known or to a lesser extent by the discovery of new improvements in old means or methods. Such discovery or invention under the theory of our patent system is entitled to a reward. In practice, however, the letters patent convey no definite title to the exclusive use of a discovery for a limited period as in theory it is supposed to do, and hence the value of the grant is merely speculative rather than of tangible value, notwithstanding the fact that it may involve the highest degree of novelty and utility.

Under the contract theory of the patent grant the government theoretically conveys to the inventor the sole right to use and practice his discovery for a limited period provided due procedure under the rules of the patent office is followed by the inventor. These rules require the disclosure of the secret of success in such a complete and detailed manner that anyone skilled in the art may practice the invention or discovery.

Having in good faith carried out his part of the contract with the Government and made his disclosure so complete and specific that anyone skilled in the art may practice his invention, the inventor commonly awakes to the fact that he has parted with his secret for the shadow in lieu of the substance of a reward. In fact, the right to the exclusive use of the discovery is commonly denied the inventor by the courts, who listen to the misrepresentation of the patent pirate. This ghoul from the bone yard of old failures resurrects the ghost of an unsuccessful idea and pretends that the discovery of the sercet of success is nothing more than the modern form of an antiquated failure. A mere change, not constituting invention, regardless of the radical difference in mode of operation which the change in form produces under the operation of natural laws. The inventor's achievement is belittled, his integrity is impugned, his credit undermined. He becomes impoverished by the expense of litigation and is then robbed not only of the credit for his achievement but all profits as well.

This common result is so antipodal of the aim and object of the constitution providing for the encouragement of the liberal arts that the conditions leading to its consummation demand analysis.

The statutory qualification for the examiner passing on the grant of a patent is that he possess competent scientific ability and legal knowledge combined, i. e., knowledge of the state of the art which determines novelty, and of the mechanical principles of natural law of action which differentiates between different inventions of the same class.

The qualifications of the judge, on the other hand, who is called upon to pass upon the validity of the patent grant, and decree its scope and effect, is merely that of legal knowlede, i. e., familiarity with the basic principles of equity which can be intelligently applied only in the light of a precise understanding of the state of the art and the mechanical laws involved.

The result of this inadequate qualification is epitomized in the report of the Bar Association of Chicago on the Oldfield Bill, to wit,

"That patent litigation is expensive, its results uncertain, and the decisions conflicting, MUST BE ADMITTED."

To the scientific mind, Federal court decisions commonly appear to involve the most impious contempts for the laws of the Creator, since the logic of their determination is explicable only upon the hypothesis of disregard thereof.

An eminent jurist of the Third C. C. A. stated, in discussing the matter, that any judge who said he never made a mistake was a d—— liar, and in effect that no man, or in fact any three men of a Court of Appeals could acquire that practical knowledge of the various arts which they are called upon to consider under the status that would render them fairly certain of avoiding serious error. They conscientiously do the best they can with the knowledge they possess, combined with the invaluable assistance secured from opposing patent counsel. The difficulties of the court were increased in this jurist's opinion because examiners in the patent office were so underpaid that capable men do not remain in the service and the custom in all cases of doubt to allow the letters patent and pass the question up to the courts for their ultimate decision and the protection of the public. Notwithstanding the lack of scientific training of the Federal judiciary, the Bar Association, he said, are strongly opposed to any change in the present status, preferring the nontechnical judiciary.

In this well known preference appears the inordinate greed and general duplicity of the legal fraternity who would banish the beautiful goddess of truth from our temple of technical justice, substituting in her place the grotesque totem pole of legal sophistry under which, by Balaamite logic, (inferior to the instinct of the ass) legal facts are evolved inharmonious with natural laws and antipodal to mechanical effect.

The trial for infringing a patent presents all the characteristics of a Salem trial for witchcraft in the old Colonial days when guilt or innoncence of the party was determined by the mechanical ignorance or unscientific belief of those who adjudged the case. So in the trial of patent causes today, the question of infringement is not a question of the utility or novelty of the disclosures contained in the letters patent nor is it a question of the good which may have been conferred on the public by the disclosure. The decision depends entirely upon the degree of persuasiveness employed in the lawyer's presentation of the case. Whether the subject matter of the patent is old or new is quite unessential to the attorney prosecuting the case, as it is his business to win the lawsuit by lawyerlike sophistry. Facts and mechanical principles are entirely at a discount, as it is quite obvious that a non-technical court would in general be quite unfamiliar with matters relating thereto.

The statement might be questioned on the ground that the Constitution intent provides that a patent shall be issued only to the party who discovers some new and useful improvement not known, used or described in printed publication more than two years prior to the application for patent. This is undoubtedly the intent of the statute, but as an eminent attorney bluntly stated the matter, the Courts of Appeal have a statutory right to blunder in every conceivable manner; to declare that new and patentable which is older than the Christian Era, and to decree any citizen or artisan an infringer of that which is old, enjoin him from using, making or selling that which is a matter of public right, and to order an accounting for all profits he has made in a businesslike manner by mak-

ing, using and selling that covered by the court's mistaken idea of the state of art.

With the rapid advance in the complexity of scientific arts, the frequency of irrational decisions on the equities of patent cases, is increasing by leaps and bounds. The percentage of inequitable and erroneous decisions is naturally greater in those branches of scientific arts which involve the greater complexity.

In one at least, that involving the mechanics of the resistance of materials, critical examination of eight Federal court decisions, one by the Supreme Court, four by the Circuit Courts of Appeal, three by District Courts, showed twenty-two erroneous holdings out of twenty-three attempts to decide the mechanical question therein correctly and in accord with natural laws. From the standpoint of amateur accomplishment this percentage is not so bad when it may be noted that men with engineering training without the aid of expert testimony might be in error on one out of four of these questions. From the standpoint of practical utility and value of the patent system it must on the other hand be obvious that deciding scientific questions correctly *once in a while* will not render the system useful and the record must be much better than twice in a while.

Criticism of the conduct or modus operandi of the patent system would be unwarranted did the system not in fact provide for the application of scientific ability in the determination of these same questions in the patent office. In each of the twenty-two cases of error on the part of the Federal judiciary out of the twenty-three opportunities to decide mechanical questions correctly every one of them was correctly passed upon by the technically trained men of the patent office and then reversed by the Federal judges, lacking in scientific training and in knowledge of the subject matter.

Upon what ground can such procedure be explained? The judges are admittedly men of the highest type and of unquestioned integrity, hence we must look for other reasons than fairness or honesty to account for this pitiable record.

We consider it is to be attributed to that mental deficiency sometimes classified as scholastic egotism. The book-taught man, because of his familiarity with a single branch of science, such as the law for example, and the abstract principles of equity taught in the law school, assumes that such knowledge is a substitute for keen observation and careful analysis of natural phenomena from which the laws of nature and the truths pertaining thereto may be deduced. While more prevalent among the legal fraternity than other professions, it is by no means confined to the law. We find occasional examples in the engineering profession as shown by the greatest of engineering disasters. The huge columns of the first Quebec bridge, improperly proportioned, were noted by the ordinary workmen in the shop as lacking that rigidity and stiffness which heavy compression members were customarily observed to possess, and they modestly called the attention of the engineers responsible for the structure to this phase of their deportment. Their observations were treated as unworthy of consideration in the light of the higher mathematics which had been brought to bear on mere assumption relative to the question, and the result was the greatest engineering disaster.

Again and again we see the exhibition of this scholastic egotism by our Federal judges. They do not heed the scientific decision of the technical examiners because forsooth the U. S. Congress, consisting largely of lawyers, have so little appreciation of scientific worth they would pay men having the double qualification of scientific and legal knowledge combined half as much as the men on the bench who possess legal knowledge only. That savors of running the Government on the I. W. W. principle that the less a man knows the more he should be paid. It does not produce businesslike results and is most expensive to the common people who pay the bill.

Lack of diversified gray matter seems to be the difficulty with our Congressmen and Senators rather than a Soviet tendency, for how otherwise can we account for hat lawyer-like theory of tariff reform which was to reduce the cost of sugar for the poor man's table downward from six cents a pound and which worked out to a reduction upward to thirty cents a pound with a shortage thrown in for good measure? A reduction of the ninety-five per cent preponderance of legal gray matter in Congress to a total limit of thirty-five per cent, leavinf sixty-five per cent for business and scientific prains, would result in a representative form of government by which questions of policy would be duly decided by the representative gray matter of the country at large.

This lack of diversified gray matter is one of the difficulties with our Courts of Appeal in patent cases. For example, had an ordinary hod carrier been sitting on the bench which held that a patent on a flat arch, distributing the metal according to the rules of a flat arch, was equivalent to the disclosure of steel in the top of the arch instead of the bottom, where the hod carrier knows the steel tie belongs when building such an arch, the public at large would have been saved a half million or more. The distribution of this decision, containing the judicial holding that putting the steel in the top of a concrete floor was the plain mechanical equivalent of putting it in the bottom, involves a potential menace to the public safety. A not over bright foreman might assume that the court was correctly advised in the matter, and following the legal facts of the decision, reverse the position of the steel in the engineer's design from the top to the bottom where it should not be, and from the bottom to the top where it should not be, and thus destroy the safety of the structure and menace the lives of the workmen or tenants or perhaps kill a dozen or more of them.

A Technical Court of Appeals Needed

The public indeed needs the protection of a technical patent court of appeals. The only objection which has been urged against such a court by United States Congressmen and Senators is that it would be expensive. The Government, however, is supposed to look after the interests of the whole people in a businesslike manner, not by that kind of efficiency which is characterized as saving at the spigot and losing at the bung. The saving of a few dollars in the salary of a technical court at the expense of the public of half a million as a result of a single erroneous decision when there are scores of them is just that kind of economy which appeals to Congressmen and Senators. *It may be stated without fear of contradiction that the public is fleeced ten times more in dollars and cents every year by semi-legalized blackmail fortified by erroneous decisions on scientific questions in patent causes than is taken from them by the entire fraternity of bank robbers, burglar and holdup artists throughout the country at large.*

As the old saying goes, to err is human. No man or set of men will at all times arrive at correct conclusions. The practical problem is to reduce the probability of error to the lowest possible extent. Every complication which may be avoided tends toward this end.

(To be continued in May issue.)

Concrete Institute Holds Active Meeting

No New Standards, But Special Attention Paid to Matters of Construction and Design

For the first time in a number of years the American Concrete Institute met recently in Chicago without such aid to registration as is given by co-ordinate bodies in session at the same time. Hitherto the annual conventions have generally, if not always, been held at the same place and about the same time as the Cement Show, the American Society for Testing Materials, or with road or housing conferences, all of which brought a number of men who helped boost the registration but who did not contribute proportionately to the attendance or discussion at the meetings. This year, however, the Institute was on its own, and every one of the 250 odd registered was there to attend the sessions or discuss papers and reports. As a result the meetings were longer and more lively than in any since the early days.

Committee Recommendations

No new standards were adopted by the meeting to go to letter ballot. One specification and one recommended practice had been prepared by the Committee on Concrete Products for block, brick and trimstone, but they were withdrawn by the committee in consideration of a proposed revision of form of all the standards of the Institute which is to be initiated this year. The Committee on Concrete Storage Tanks submitted some simple changes to its recommended practice of last year and the Committee on Concrete Houses presented a tentative draft of a specification. A proposed standard specification for reinforced-concrete chimneys by the committee of that name was referred back to the committee because of some evidence on the floor of lack of harmony among its members.

This absence of standards does not mean that the committees have been idle during the past year. On the contrary they have been exceedingly busy. Eighteen out of the twenty-two in the Institute reported at the meetings and most of the reports were more than merely of progress. Rather the indication is that concrete is not so simple or stabilized a material that it is possible to come before any body with a set of paragraphs which state that this and that are facts and things shall be done thus and so, only to have to appear the following year with some new assertions which require revision of the standard. The committees seem to be showing a commendable desire to study the fundamentals of their respective subjects, to undertake research and apportion out detail investigation in the effort to establish the data on which a fair permanence of standards may rest. In this category may be noted particularly the committees on roads, bridges, metal forms, aggregate and concrete surfaces. The committee on the Rockaway fire cleaned up its work by presenting a final report on the fire in the concrete warehouse in Far Rockaway, N. Y., in 1916, a report which not only describes that fire but the tests on the building after repair and which discusses in some detail the effect of fire on concrete.

The Committee on Research for the first time presented a comprehensive report, which outlined a program for future work of the Institute in the field of investigation. It is proposed that the various subjects indicated, on which a number of different agencies are working more or dess independently—and on some of which no work is being done—be portioned out to the committees of the Institute either for original study or for collation of material and co-ordination of effort. The move is a definite step forward in a systematic study of concrete.

Discussion on Design and Construction

Two major and one minor subdivision of the discussions before the convention may be had. The major subjects were design and construction; the minor, concrete products. In the old days of the Institute's predecessor the latter subject was of prime importance but of late years it has been allowed to lapse and the concrete product men have not felt altogether at home. This year they had one entire session at which their problems were discussed, particularly the question of fire protection and insurance risk of the concrete block structure. Progress was made toward a program of fire tests of this type of construction, to the end that the fire underwriters may have what they have not now, some definite information as to the fire resisting qualities in specific kinds of concrete block structures with blocks of a specific make and material. It is being recognized in the Institute that the factory-made concrete product is having a wider use and that it is necessary to provide some authoritative agency which can be a forum and a judge. The prospects are that in its future activities the Institute will devote more time to the concrete product.

Of the major subjects design, as in the past, held a large part of the program. Foremost among the papers was a joint presentation by Dr. H. M. Westergaard of the University of Illinois, and W. A. Slater, of the Bureau of Standards, of a discussion of "Moments and Stresses in Slabs." This is really a monumental piece of work, which will run into a hundred or more printed pages in the "Proceedings" of the Institute. Dr. Westergaard has made an analytical examination of the slab of unprecedented thoroughness and has applied the developed theory to the design of the reinforced-concrete girderless floor. Mr. Slater has studied a number of beam tests with the idea of discovering the laws of variation between observed and computed stresses and has applied the knowledge so gained to an analysis of most of the available full-size tests of concrete flat-slab floors. The complete paper when available should be an invaluable compendium of knowledge of the girderless floor.

Two papers on the design of columns were given, one by S. C. Hollister on bending moments in interior columns and the other by F. R. MacMillan on a new hooped concrete column formula. The former analyzes the moments of columns in a building due to various disposition of load on the floors and panels; the latter utilizes the steel compression due to concrete shrinkage and time yield and deduces a formula which gives a more economical column than do those in general use. Both papers present studies which doubtless are being used by the joint committee in its present preparation of a concrete specification.

Problems of the Concrete Builder

The other major field is one to which the Institute is devoting more and more attention, that is the problems of the concrete builder, who generally, of course, is a contractor. The Committee on Contractor's Plant continued its last year's study of building construction plants with a thorough analysis of the comparative merits of seven different kinds of layout and critical descriptions of three specific layouts. The Com-

mittee on Floor Finish outlined the proper methods of laying a concrete floor. Both of those reports had enthusiastic discussion by men of practical experience. Papers of direct interest to this field were the reports of a performance test of a concrete mixer by Prof. W. K. Hatt, two papers on concrete road construction equipment by F. M. Balsley and C. R. Ege, methods and formulas for coloring concrete by John W. Lowell, an investigation of the possibilities of using greater tolerances in sand and gravel grading for road concrete by Professor Hatt and R. B. Crepps and a study of shrinkage of stucco as it affects its placing by J. C. Pearson.

One report, that of the Committee on Standard Units of Design, is an atempt at harmonizing the two major subjects. It is a tentative recommendation of standard sizes and dimensions to be adhered to in building design in order to reduce the expense of unnecessary variations which the designer may put in with the idea of saving in material, but which on account of lack of uniformity may really add to the cost.

The Wason Medal was awarded to W. A. Hull for his paper "Fire Tests of Concrete Columns," presented to the 1920 convention.

Reports showed that the Institute is in a satisfactory condition with well up toward 700 members and a small balance in bank. Steps were taken at the convention to develop the scope of the society by the prosecution of a more definite plan of operations and better co-ordination of committee work. H. C. Turner of the Turner Construction Co., New York, was continued as president and W. P. Anderson of the Ferro Concrete Construction Co. of Cincinnati, Ohio, elected as junior vice president, C. W. Gow of Boston holding over as the senior vice president. Robert W. Lesley, after a number of years of service, has retired as treasurer and Harvey Whipple, the secretary of the Institute, was elected to take his place. His address is New Telegraph Building, Detroit, Mich.

Anchor Ventilated Corn Crib Blocks

The crib as shown in the illustration is 18 feet in diameter and 24 feet in height. The blocks from which it is built are 24 inches long and lay in the wall 8 inches in height, with a thickness of 4 inches. Each block has three full holes and two half holes, each hole being 2½ inches wide and 4½ inches high, and with a slight slant on the front, which will allow any moisture to drain outward instead of inward. The ventilated air space in the corn crib is 25 per cent. Each block has a groove in the top in which is placed ¼-inch reinforcing.

The corn crib is equipped with a concrete floor 4 inches thick, with a 2-inch slant from the center to the sides. It also has a center air chute 2 feet square, built from the same blocks as are used for the outer walls. On top of this below the roof, is placed a 26-inch tile, and on top of this is a 24-inch tile, this latter extending through the roof. The shoulders between the two sizes of tile is used as a support for the forms on which the concrete roof slab was cast, the other end of the boards resting on the wall coping. The concrete roof slab is 3 inches thick built as follows: Spacing strips run from the coping to the center of the roof 3 feet apart. On these spacing strips we place quarter inch twisted reinforcing 8 inches apart. The twisted reinforcing circles around the roof similar to a spider web.

Crib of this size will hold 2,000 bushels of corn and can be built at a cost not to exceed $350. The ordinary frame corn crib with a driveway 24 feet wide, 32 feet long and 8 feet high will hold 2,300 bushels of corn. The cost of such a crib is from $500 to $650. "We are very certain that we can house corn using the Anchor Ventilated Corn Crib Blocks much cheaper

than you can from the first-class frame construction," writes the Anchor Concrete Stone Co., Rock Rapids, Iowa, who manufacture the famous Anchor corn crib block machine and Anchor automatic tampers.

Gypsum Deposits in the United States

New Government Report on Sources of Hard Wall Plaster

A bulletin describing the gypsum deposits in the United States has just been issued by the United States Geological Survey, Department of the Interior. Gypsum is the rock used for making plaster of Paris and hard wall plaster, and it is also an ingredient of Portland cement and is used as a fertilizer. The bulletin shows that gypsum is distributed from New York to California and from Michigan to Texas. The deposits in some states are so small that they may be worked out in a few years; those in other states, like Wyoming and New Mexico, consist of thick beds that crop out at the surface for hundreds of miles and that are seemingly inexhaustible. The bulletin contains 325 pages and many illustrations and includes a technical discussion of the physical and chemical properties of gypsum, a classification of the deposits by origin, a history of the gypsum industry in the United States, and a brief description of processes of mining and milling, as well as a bibliography, but it consists principally of descriptions of the deposits, by states, written by state geologists and others who are thoroughly familiar with them. The book, which is published as Bulletin 697 of the U. S. Geological Survey, was compiled and in part written by R. W. Stone, a geologist who has made a special study of gypsum. A copy can be obtained free on application to the Director, U. S. Geological Survey, Washington, D. C.

The Production of Molding and Silica Sand for Glass Making

Over thirty-six years ago, Mr. E. M. Ayers of Zanesville, Ohio, started the operation of sand pits near Zanesville, Ohio. The business prospered and grew steadily until in 1904 the company was reorganized under its present name, The Ayers Mineral Company, to operate six plants in all, four of which produce molding sand for iron casting, sold to a wide market from New England to the Mississippi River, and two a fine grade of silica sand for glass making and steel molding.

The largest of these plants is near New Lexington, Ohio. The plant, which is the subject of this article, has a mill capacity of 400 tons daily. Until five years ago the sand was mined by hand and trapped with slip scrapers as is done in many hundreds of plants over the country today.

Mr. E. M. Ayers, however, realized that through the use of a steam shovel, his costs could be considerably reduced, and his operations greatly simplified and quickened. His cost of production at this time averaged 15c per ton.

Three years ago, therefore, this Company purchased a 14-B Bucyrus revolving shovel, equipped with a 5/8 cu. yd. dipper. The shovel was mounted on caterpillar traction.

The operation is extremely simple. The caterpillar mounting of the shovel enables the machine to be moved about the pit quickly and easily with the minimum of ground men. In fact the shovel operation itself requires but an operator for the shovel, a fireman, and one ground man.

No stripping is required, the shovel loads 4 ton steel rocker cars, which are hauled 2,000 feet to the mill by a gasoline locomotive. According to Mr. Ayers, the cost of operation has been reduced about one half with a possibility of increasing the output considerably over the present mill capacity of 400 tons, if it is so desired in the future.

At the mill the material goes through a centrifugal pulverizer and a wire screen to an elevator, from which it is carried up on a 24-in. belt feed to a storage bin with a capacity of 1,500 tons.

E. M. Ayers is directly in charge of operation, ably assisted by C. O. Beckett as superintendent. Mr. Ayers is president of the American Sand Association. —[The Excavating Engineer.]

14-BBucyrus shovel digging sand for the Ayers Mineral Company, New Lexington, Ohio. The shovel loads 4-ton rocker cars hauled by a gasoline locomotive 2,000 feet to the mill. The slip scraper seen beside the shovel is attached by chains to the dipper and used to clean up spill on the track. This shovel has cut operating costs 50 per cent over the former hand and slip scraper method.

Jeffrey's Denver Office

The Jeffrey Manufacturing Co., Columbus, Ohio, announces the removal of their Denver office from the First National Bank Building to 421 United States National Bank Building, of that city.

C. O. Beckett, Superintendent Ayers Mineral Company

Save Cement

Why buy cement and ship it back to the mill in returned sacks, says the Handy Sack Baler Co., 620 S. Second St., Cedar Rapids, Iowa. "As a result of using our cement bag cleaner in building one plant there was saved one hundred and four tons of cement and over one hundred dollars on freight in sending empty sacks back to the mill, besides the saving of labor."

These savings as well as the improved working conditions should appeal to you. Hand or power operated.

A descriptive circular giving further information will be mailed you upon request.

Zinc Conductor Pipe

On a certain building in Philadelphia a zinc conductor pipe installed in 1900 is still in almost perfect condition and gives promise of many additional years of service.

Car Shortage in 1921

J. J. Collister, Traffic Manager, The Atlas Portland Cement Company, New York City

For the past six weeks cars have been so plentiful apparently that the average shipper cannot picture another car shortage immediately. The railroads of the country report ownership of 1,062,836 box cars. The last statistics available at the time this is written show less than 30% surplusage after filling box car orders.

The virtual suspension of export and import traffic and the depression in domestic business for the past two months has created some pessimism and purchases have been curtailed. Surplus stocks everywhere are nearing depletion and heavy buying must soon be resumed. The products of the farm are yet to move in quantities and the margin between the present car surplusage and a shortage of equipment is narrow.

Statistics compiled by the bureau of Railroad Economics show that the average mileage per freight car per day was increased in 1920 over 1919 approximately 11 per cent.

The heavier loading in 1920 coupled with the increase in the average mileage per freight car per day added the equivalent of at least 500,000 cars of all classes to freight service.

While shippers in 1920 through necessity made the maximum use of cars by loading them to capacity and releasing cars promptly, there has been some let down in efficiency in the past sixty days, but heavy loading has been discontinued on only a few commodities. Light loading of commodities which move in heavy volume can turn the present surplus of box cars into a shortage. A shift in the market price of grain and cotton can create such a demand for box cars that empty cars will have to be tided from the East to the West and South.

Today immediate deliveries of purchases are possible but the first indication of a short car supply may serve to stimulate buying and the impetus can carry us into a situation which will compare with 1920.

It has been stated that there are not enough box cars to take care of the normal shipping of this country and it is unlikely that the volume of tonnage in 1921 will fall below normal.

The Paving Mixer That Makes the Money

The modern improvements in paver design and construction which meet the demands of the paving contractor for higher efficiency and greater economy is well illustrated by the improved type of the Jaeger Paver.

This machine embodies all the latest practical and successful improvements and refinements in up-to-date paver construction. It meets the requirements of all sorts of paving jobs to the satisfaction of a large number of users. It is lighter and far stronger than old-style pavers—turns out more and better concrete in less time and with less expense for labor.

Large yardage, easy portability and quick convertibility into a mixer for every job. Rapid loading, fast mixing, quick moves, small crew requirement—these are your demands today. You must have the machine that is profitable, whether paving jobs are many or few. Jaeger Paver meets these demands plus. Its performance on paving jobs in various parts of the country has shown its great speed, strength and economy. It sustains Jaeger reputation. Built in four sizes and fourteen styles. Send for illustrated catalog. Jaeger Machine Company, 212 Dublin Street, Columbus, Ohio.

Dragline Cableway Excavators

Sauerman Bros., 1139 Monadnock block, Chicago, have issued and are distributing three catalogs descriptive of Dragline Cableway Excavators, Bottomless Power Scrapers and Handling Coal with Power Scrapers and Dragline Cableways. The dragline cableway excavators meet a wider range of conditions than any other type of gravel handling equipment, being suited to digging either loose or hard packed material and operate with equal facility whether gravel is dry or under water. They work in spans of 200 to 700 ft. and dig, elevate and convey from pit to hopper or pile in one operation, which enables them to handle gravel at a minimum cost per ton. The bottomless power scraper retains the essential virtues of the simple power scraper. It both digs and conveys the material without further complications and when the length of haul is favorable it does it at a low cost. It has large capacity and eliminates hand labor, loads and unloads automatically and costs less to install and to operate than other means. The purpose of handling coal equipment is to distribute the coal to the desired points in storage and to reclaim coal to hopper or elevator. Sauerman cableways are recommended chiefly for reclaiming and are especially useful when pit or under-water storage is available. Books will be sent free on request to the firm.

Dependable Concrete Machines

CEMENT & ENGINEERING NEWS is in receipt of a copy of a beautiful album, 9x7 inches, containing actual photographs of the "Besser Line" of concrete products machinery. All sales talk is eliminated in the effort to give only essential engineering information. The company hopes it will serve to keep Besser Machinery in mind whenever concrete products are under consideration. The business of the Besser Sales Co., 1312 20th street, Alpena, Mich., is the design, sale and installation of complete concrete products. In accord with the spirit of the times, their foremost considerations are quality of machinery, quality of product and service to users.

The company includes in its well-rounded active organization:

—An industrial engineer of wide experience.

—A designing engineer of long training in experimental and research work in various industrial fields.

—A commercial engineer with legal training and extensive business experience.

—A construction engineer who has been active in the manufacture of concrete products on a quantity production basis for twelve years.

—An engineer of international reputation in the chemical, mechanical and civil engineering professions.

—Sales representatives who are backed by many years of experience in the concrete products field.

In addition to the above, there are associated with the organization, a number of engineers of large experience in the concrete products industry, the combination giving a breadth and comprehensiveness not heretofore found in the industry.

Employees' Houses of Reinforced Concrete

Remarkably Low Construction Costs on Houses at North Dighton, Mass.

By Leslie H. Allen, Fred T. Ley Company, Springfield, Mass.

In the center of the town of North Dighton, Mass., stands the plant of the Mt. Hope Finishing Co., established in 1812. This plant has been steadily growing, and being practically the only industry in the place, has been the sole factor in the growth of the town.

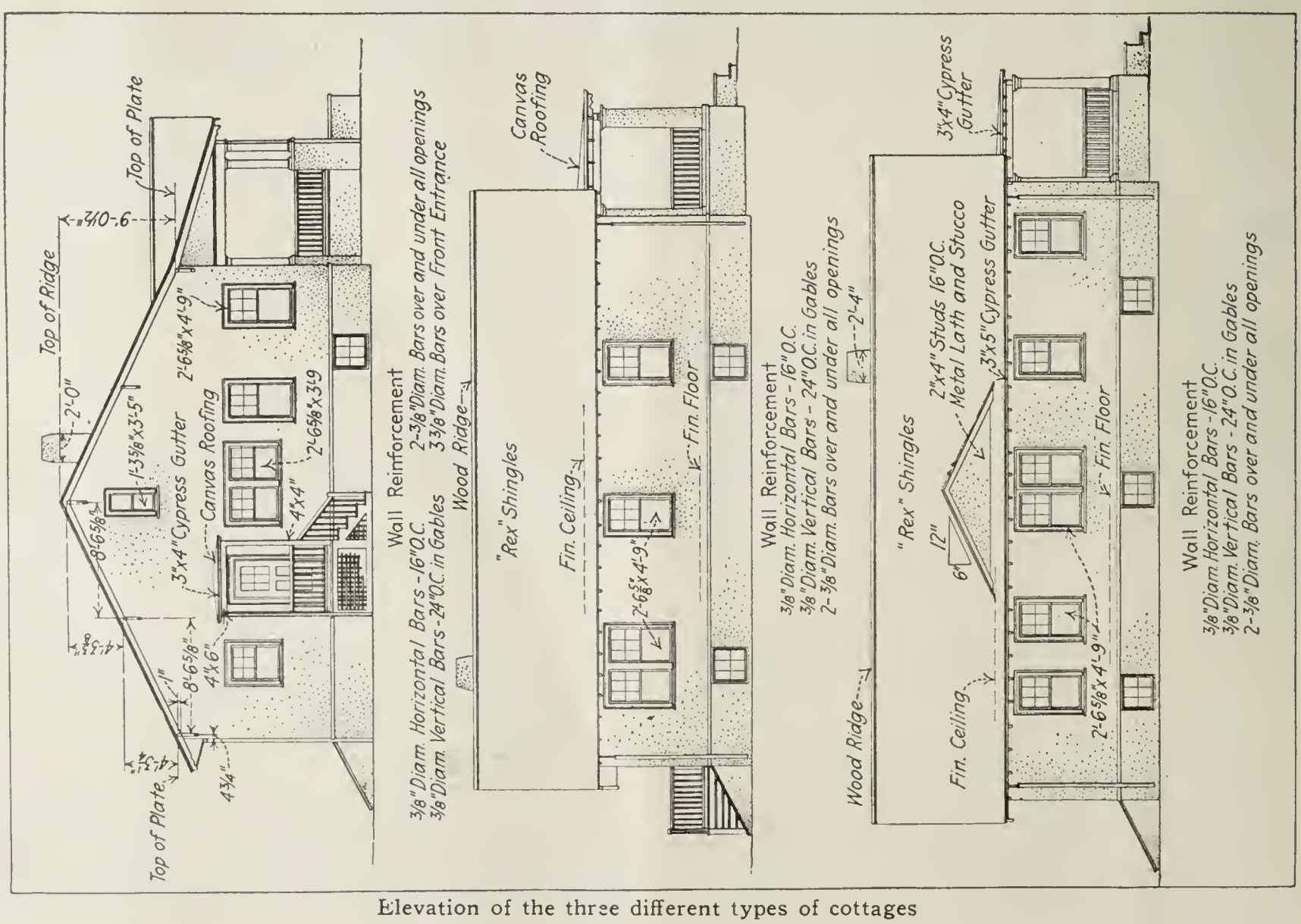
For many years, a most enlightened policy has been pursued by the officials of this company toward its employees, their sole desire being to make North Dighton a healthy and happy colony of contented employees. A large farm is operated by the company, from which dairy and vegetable products are retailed by the company at cost. The roads are well kept, and the company has from time to time built a large number of houses for their help.

These houses are of many different types of construction and are planned according to the needs of the various classes employed in the mill. Many of the older houses are of frame construction; latterly some have been built of tile, some of stucco, some of brick.

During 1920 the advantages of concrete construction were brought before the officials of the company and with a view of trying out this method of construction, an order was given for the building of three houses of concrete.

Concrete walls with furring strips in place. Forms for concrete floor ready for reinforcing steel.

Cottage during wall construction. Small amount of scaffolding required.



Elevation of the three different types of cottages

Our company was at that time carrying out a large factory addition for the Mt. Hope Finishing Company and was selected to build the houses. After a good deal of consideration Morrill steel forms were selected for the building of the three houses.

The Morrill steel forms consist of a series of steel plates 32 inches long and 16 inches high, placed on both sides of the wall, which is poured one course at a time. After pouring the first course, a second tier of plates is placed upon the first and connected to them by hinge arms of steel that act as braces.

When the second course is poured the first course is lifted by means of the hinge arms and becomes the form for the third course of plates. The inner and outer forms are held apart by spreaders of short pieces of pipe which are driven out as soon as the forms are moved.

The walls of the cellar were made 8 inches thick and the walls of the upper stories 6 inches. It was planned to cover the outside of the walls with white cement stucco. The concrete mixture was 1:2:5. Cinders produced from the power house of the Mt. Hope Finishing Co. were used for coarse aggregate.

In one of the houses it was decided to use concrete floors. The officials of the company knew that first class hotels have concrete floors covered with rugs, the houses and a concrete floor for the third house, which are proving perfectly suitable. They desired to try this out for industrial housing but there was some doubt as to whether it would be satisfactory, and it was therefore decided to use wood floors for two of

Cottage of Type No. 3. Note that simplicity of lines brings good architectural appearance.

Front view of cottage showing textural treatment of surface stucco

Detail of wall at window opening. Hole in concrete were left by pipe from spacers afterward driven out.

In these days of rapidly fluctuating costs, unit cost figures are liable to be misleading. However, an indication of the efficiency of the methods used will be seen in the fact that with common labor at 60c per hour and carpenters at 90c, the fore work of the cellar was done for 2½c per square foot per side and the forms for the walls above the cellar for 3 2/10c per square foot per side. These figures are considerably less than the cost of wooden form work in 1914.

Concrete for the cellar was placed directly from barrows wheeled upon runways; concrete for the superstructure was placed in pails, hoisted by hand to the required height. Naturally the cost of placing concrete in this way is high—the lowest figures reached on the 6-inch wall being $3.78 per cubic yard. When this figure is combined with the cost of forms, however, it can be seen that the economy on form work is greater than the extra cost of placing the concrete. The net results in the case of these houses at North Dighton, was that concrete walls covered with stucco on the outside and furred and plastered on the inside, were actually built at a figure which raised the total cost of the house only about 3% above the cost of frame construction.

The Mt. Hope Finishing Company have these absolutely permanent, fireproof structures and the maintenance of such buildings will be far less than the cost of frame construction so that this small excess cost will be quickly saved in lessened maintenance charges.

New Catalog Jeffrey Scraper Conveyors

The new catalog, No. 257, on Jeffrey Standardized Scraper Conveyors, manufactured by Jeffrey Mfg. Co., 914 N. 4th St., Columbus, O., which is now ready for distribution, will be sent free to interested persons upon request.

This catalog features both Single and Double Strand Conveyors designed to handle all kinds of loose products in manufacturing and mining industries, power plants, retail coal yards, canning plants, sugar mills, and practically all other industries.

The many pages of instruction, specifications and dimensions given, have been compiled in such a way that the engineer, and often the purchaser who is more or less unfamiliar with engineering problems, may easily select the right conveyor to fit his needs, saving the time heretofore required in making drawings and layouts, special designing, pattern making, etc.

One of the Pioneer New England Granite Quarries

The story of the development of the immense granits deposits in the Barre hills, 10 miles from Montpelier, Vermont, forms one of the most picturesque pages in the industrial history of New England.

It is not our intention here to trace this history in any detail, but a brief sketch thereof is perhaps necessary in order to obtain a clearer perspective of the development work now in progress that has led to the use of a steam shovel.

How the Industry Grew

About 30 years ago James M. Boutwell came to Millstone Hill, Graniteville, Vermont, and took charge of a quarry which had previously been a failure. Mr. Boutwell had already made a name for himself as a man who was able to get things done.

As the quarries of Vermont were developed, it became obvious that the old method of hauling granite to the railroads with oxen would soon become inade-

Mr. James M. Boutwell, a Pioneer in the New England Granite Industry.

quate. A railroad direct to the quarries was needed, but as the quarries were located high up in the Vermont hills the problem of building a railroad was a difficult one. Mr. Boutwell tackled the job and in two years the railroad was completed. The difference in elevation between the two terminals of the railroad is over a thousand feet, and twenty-six miles of track, switching back and forth up the grade, were necessary, although the distance as the crow flies is only four miles.

The failure of others in attempting to work the quarries did not bother young Boutwell and in five years he had blasted $200,000 out of the quarry. He then purchased the property for $40,500 and started operations on a large scale.

New buildings were constructed, derricks and other machinery were installed and the quarries began to assume their present importance among the industries of New England. In 1903 H. W. Varnum, a well-known railroad contractor, became associated with Mr. Boutwell and in 1905 Mr. George B. Milne, who had had previous experience in operating a quarry in the same district, joined the firm.

Equipment of Plant

The demand for the famous dark Barre granite, known as "Rock of Ages," became so great that in 30 years this quarry has grown to be the largest monumental granite quarry in the world. At present nine quarries are being operated within a circumference of 1¼ miles, and over 300 men are employed.

The plant is equipped with most modern machinery manufactured for quarrying granite. Approximately 40 drills and channellers, manufactured by the Sullivan Machinery Company, are in use. What is said to be the finest and most up-to-date air compressor plant in New England furnishes air for the drills. The plant is equipped with a cross-compound compressor, with a capacity of 3,800 cu. ft. of air per minute at 100 lbs. pressure.

Method of Quarrying

In blasting, holes are drilled about two-thirds of the depth to which it is desired to split the granite. A sharp groove is then cut in the holes in the direction the split is wanted. After the black powder and detonator are placed, the hole is filled about half aay down with a paper wad. This leaves a chamber for gas pressure. The holes are connected in series and shot by electricity. Sullivan plug drills are used for plug and feather drilling.

As all rock quarried here is for monumental use,

Two Piles of Rejected Granite, which will be handled by the Steam Shovel

great care is taken not to injure the granite in blasting. After a block is moved by blasting, it is then quarried to approximate dimensions with plug drills.

Twelve derricks with 100-foot masts and 90-foot booms are used for removing the granite from the quarries, which are two hundred feet deep in some places. Smaller derricks down in the quarries feed these larger ones.

The business end of the 100C Shovel, which is moving the Mountain of Granite

25 and 50-ton hoisting engines lift the quarried granite to the surface.

All granite is rigidly inspected and rejected granite, or grout, is dumped in large piles near the quarries. For thirty years these grout piles have been accumulating until at present some are nearly 200 feet high.

No use for this waste has been discovered which would make it worth while to pay the cost of its transportation away from the quarries.

Steam Shovel Operation

A few years ago it was discovered that some of the best granite lay under these grout piles. The quarries were extended to the edge of the grout piles and as development required the piles were moved by derricks. This method proved slow, expensive, and unsatisfactory.

Realizing that a better method of moving the grout piles was needed the company installed a Bucyrus 100-C Railroad-type steam shovel.

The shovel is equipped with a 3½ cu- yd. dipper and is literally making the rock fly. Single blocks of granite, weighing as much as twelve tons are handled without difficulty by the big shovel. The granite is hauled

The 100-C Buckrus shovel working along the quarry edge, with an 80-foot bank on one side and a 60-foot hole on the other. This view gives a good idea of the large amount of grout to be moved.

one-third of a mile and is being used in making a railroad fill for the Barre & Chelsea Railroad. Three 8-yd. end dump and seven 6-yd. Western side-dump cars hauled by a 32-ton Vulcan locomotive, are used for carrying the grout. Mr. Boutwell himself, who was an engineer on the M. & W. R. Railroad in the days of the old wood burner, was at the throttle of the locomotive on its initial trip.

There are ten of these huge piles of grout containing from 100,000 to 250,000 cubic yards each. The shovel is making very satisfactory progress and valuable deposits of granite are being uncovered. After the waste granite has been removed the shovel will probably be used for stripping the new quarries.

Superintendent H. R. Shailer is in charge of the development and construction operations at the Boutwell, Milne & Varnum quarries, and Alfred M. Roach is production superintendent.—[The Excavating Engineer.]

Pierce Silo Roof

Careful attention must be given to the accessories of a concrete silo, as well as to the body of the silo itself, if it is to be what it should be. One such accessory which is being found of value is a Pierce extension roof, made by the Pierce Co., Waldheim Bldg., Kansas City, Mo.

This is a roof which can be opened up out of the way when filling the silo; and when so opened it forms an extension to the top of the silo, which takes care of the settling ensilage.

The roof consists of three parts: a base, a double section segment, and a single section segment. The

base is fastened to the silo by means of strap iron. Segments are made of crimped galvanized sheet metal, and both single and double section segments are hinged alternately to the base. The double section segments have two wings hinged on each side, which fold one inward, and the other outward. When opened and locked they form a complete circle as shown in the illustration.

The roof, when open, has the same inside diameter as the silo.

Cement Brick with Granite Face

To reproduce on the face of cement brick, without the use of acids or other chemicals, all the natural texture, color, and beauty of granite, marble, feldspar, or other stones capable of giving attractive surface effects, is an achievement now credited to the Helm Press Brick Machine. This machine is made by the Helm Brick Machine Co., 762 Mitchell St., Cadillac, Mich., and the accompanying illustration gives a fair idea of the appearance of a Helm press brick of granite face texture.

The texture may be coarse or fine, rough or smooth. The face is readily waterproofed. Moisture will show on the face no more than on the most expensive clay face brick. The face is even stronger than the body of

Helm Press Brick of Granite Face Texture

the brick or block. The edges and corners are sharp and strong.

Beautiful, distinctive, and attractive textures are given to the commonplace surface of brick and block made from ordinary cement, sand, and gravel at the mere cost of an hour's labor to a thousand brick.

Enormous profits are available. A thousand granite face brick, which can be made for about $8.00, will sell at about $16 to $20. Cheaper grades pay big profits, too.

This process is so simple any novice can handle it successfully and produce effects as beautiful as that here shown. In every community there is a field for the introduction of this beautiful product, so that the Helm Press and the facing process that goes with it are well worth looking into. Write the Helm Brick Machine Co. at the above address.

Where the Kent Mixer Established a Record for Quantity Output for One Year

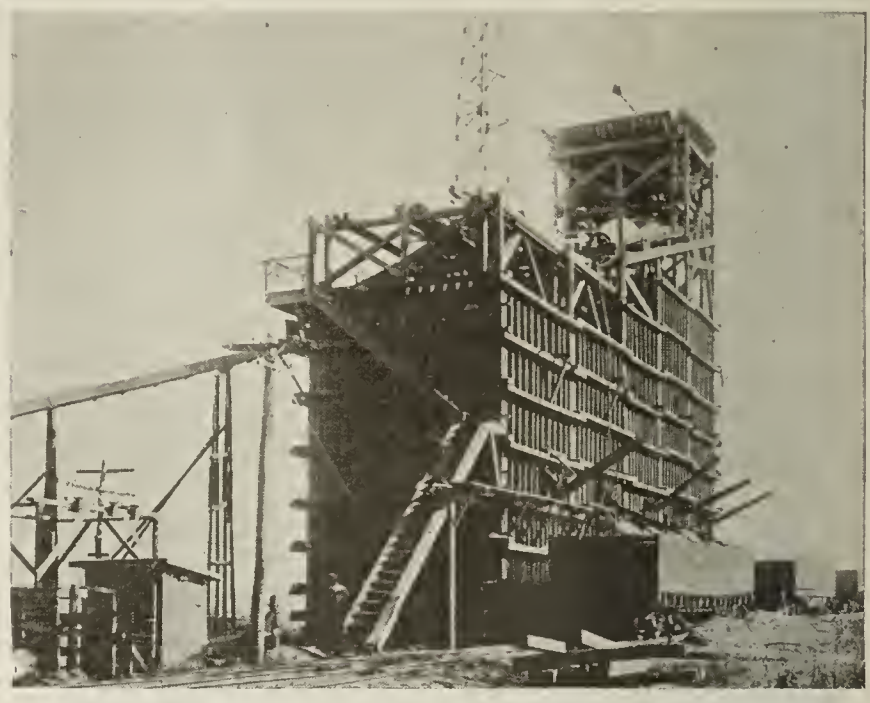
The Kent continuous mixer is shown here in operation in the plant of the Michigan Silo Co., manufacturers of concrete staves silos, Kalamazoo, Mich., who have established a record for quantity output for one year when it completed 900 jobs in 1920. Of this number between 850 and 860 were new silos, about 30 were extensions on old silos and the balance consisted of water supply tanks and grain bins. Considering transportation difficulties and building material shortage in 1920 the record is one which other manufacturers may find difficult to surpass.

The Kent Mixer performed in this plant without breakdowns or repairs and turned out a satisfactory quality product.

Electrically-Operated Sand and Gravel Plant

One of the most modern sand and gravel plants in the South is that of the Premier Sand & Gravel Co., Inc., in the Birmingham section, which produces only washed and screened materials. The company owns 100 acres of land in the Jackson's Lake district. Its plant is entirely electrically operated, power being obtained from the Alabama Power Co.'s transmission line, and its use has resulted in a big saving of labor. It is a modern Link-Belt plant, located on the Louisville & Nashville Railroad. The main offices of the company are at 607-10 Woodward Building, Birmingham.

The plant now represents a cableway excavator, and the officials are planning to put in a dredge having a capacity of 40 cars per day, thus making the future capacity of the plant 60 cars daily.



W. H. Brooks, general manager of the Company, who is an engineer, spent about a month with Raymond W. Dull going over the various plants in the Chicago gravel district before deciding upon the one now in use. Sand is now being produced from a thorough engineering standpoint, that is, a sand that will give only the highest test when used in concrete, and one that is thoroughly washed, the clay and loam being removed.

The Standard Fuel & Material Co. of Birmingham has been given the entire sale of the company's product.

The officers of the Premier Sand & Gravel Co., Inc., are: C. G. Kershaw, president; J. L. Brooks, secretary; T. M. Porterfield, treasurer, and W. H. Brooks, general manager.

Loading and Unloading Material

The Portable Machinery Co., Passaic, N. J., has just published a 24-page catalog entitled, "Portable Conveyors." This is complete with illustrations showing the various uses of the scoop conveyor and other portable equipment manufactured by this firm, and describes clearly the labor, time and money-saving features of the machines in storing, reclaiming, loading and unloading material such as cement, sand, gravel, crushed stone, coal, coke, ashes, fertilizer, chemicals, etc. Copies of the catalog will be sent free upon request.

Cement for Laying Brick

Plans have been matured for some time and the work is now well under way increasing the capacity of the plant of the Louisville Cement Co. near Louisville, for turning out Brixment to meet the increased demand for this particular output. Brixment is made from what was formerly known as Louisville Hydraulic Cement, improved by the admixture of certain materials and by the use of patented process which has resulted in overcoming the difficulty due to the too quick hardening of natural cement and in increasing its plasticity.

News of the Cement Mills

A large force of men is at work on new construction at the Gilmore Portland cement plant at Gilmore City, Ia. This company is increasing its plant from one of 1,500 barrels daily capacity to one of 4,000 barrels per day. When completed the Gilmore plant will be as large as any cement plant in Iowa and one of the largest west of the Mississippi river. M. J. Nicholson of Ft. Dodge, Ia., is president of the company.

Users of Portland cement are advised to have tests made at the shipping point or after the shipment is received because it has been found that some low grade cement has been put on the market. The senior class in the Materials Testing Laboratory of the College of Engineering, University of Arkansas, brought out these facts in tests they made recently in determining the proper mixture of a number of Washington county gravels for reinforced concrete bridges.

The Bonner Portland Cement Plant, Bonner Springs, Kans., will operate this winter in an effort to manufacture cement enough to meet its demand. To prevent shutting down this winter bins for the storage of rock have been built.

Officials at the Southwestern Portland Cement Co., El Paso, Tex., announced that no reduction had been made and none is expected. They stated also there probably will be no reduction of forces at the plant.

The Callaway & Merry Development Co. who are developing the Calmer Portland Cement Co., Rhodes Bldg., Atlanta, Ga., advises us that Richard K. Meade & Co., 11 E. Lafayette St., Baltimore, Md., will in all probability design and build their new cement mill in Bleckley County, Ga., 31 miles south of Macon on the main line of the Southern Railway, where they have 300 acres tested sufficient to make 150 million barrels of good portland cement. Work will not be started for at least sixty days.

Addressing the shareholders of the Canada Cement Co. at the annual meeting, the president of the company stated that the inability to obtain coal was largely responsible for the decrease in business and in earnings during 1920. Moreover, there was an increase of 54% in the cost of coal, 145% in labor, and 196% in other items entering into production, while the selling price of cement had increased only 90%. The earnings during 1920 amounted to 3.1% on the common stock of the company. The earnings were 22% less than in 1919, and more than $500,000 was, as a result, withdrawn from the surplus account.

B. J. Latimer resigned as chief engineer for the Southwestern Portland Cement Co., El Paso, Tex., to accept the position of superintendent of the Nebraska Cement Co., Superior, Neb. Mr. Latimer has been assistant superintendent and chief engineer for the Southwestern company during the last 4 years and has just completed the design, construction and installation of a 2200 hp. waste boiler plant at that place.

H. M. Hess, formerly chief chemist of the Monarch Cement Co., Humboldt, Kan., is now with the Edmonton Portland Cement Co., Edmonton, Alberta, Can., as chief chemist.

The action of the state cement commission in taking options on sites for a cement plant at Rapid City, S. D., indicates the possible location of such a plant to be erected by the state. On one of these sites a building has been started and material and machinery located by private parties.

Hydro electric power is available at these locations and the fuel situation is favorable. These options have been taken after investigation of the cement resources of the state. Material of excellent quality has been found in large quantities.

The Sandusky Cement plant at Syracuse, Ind., is completely closed down, only two men remaining, the superintendent in the day time and a night watch at night.

Carmine Talotta, Third St., Cementon, Pa., declares he has invented and patented the best and latest bag dusting machine.

The United States Potash Co., Fred A. Ballin, president, Aman Moore, vice-president and general manager, 608 Hibernian Bldg., Los Angeles, Calif., manufacture "Moolith" brand portland cement and the Monolith waterproof portland cement. Their plant is located at Monolith, Kern County, California, which was formerly owned by Los Angeles County.

The plant of the Lehigh Portland Cement Co., at Mason City, Ia., which was closed last December due to the uncertain market conditions, has been reopened March 15 and is going at full blast. Oscar Davis is superintendent.

The Globe Portland Cement Co. has been organized in Minneapolis with a capital stock of $5,000,000 by L. Nedderson and H. L. Johnson of 420 Kraft Bldg., Des Moines, Iowa, and F. P. O'Malley, St. Paul, Minn.

An involuntary petition in bankruptcy was filed in the United States district court, Muskogee, Okla., against the Choctaw Portland Cement Company of Tulsa by the Abbe Engineering Company, the Crescent Belt Fastener Company and the International Time Recording Company, all of New York. The plaintiffs assert they hold unpaid claims approximating $1,000 against the defendants.

The interstate commerce commission has suspended tariffs, effective March 1, which proposed substantial increases in rates on cement from Kansas points and Dewey, Ok., and on lime from Ash Grove and Galloway, Mo., to New Orleans, Vicksburg and other points in the Mississippi valley.

The new plant of the Petoskey Portland Cement Co., Petoskey, Mich., daily capacity 2,000 barrels, has started operations. The plant is declared by engineers to be among the very best in the country.

Fresno, Calif., interests in the San Joaquin Portland Cement Co. recently announced that work is to start within a very short time on the first unit of a Portland cement plant at either Exeter, Visalia, or Three Rivers, which will have a daily capacity of 1,000 barrels. Some three spots are under consideration as a site for the

plant, and the announcement by the company states that "it may necessitate the building of an extension of the Visalia Electric line to the town of Three Rivers, where the largest deposit of limerock owned by the corporation is located.

The company for the past two years has been quietly carrying on an extensive and exhaustive investigation of its various limestone and clay deposits, and these were found by the experts to be eminently satisfactory for the economical manufacture of the highest grade of portland cement.

The following board of directors will control the policies of the corporation:

F. Dean Prescott, Valley Lumber Company, Fresno; W. B. Holland, Holland & Holland, Fresno; R. F. Felchlin, contractor and builder, Fresno; Arthur D. King, King Lumber Company, Bakersfield; Nathan M. Ball, contractor, Porterville; Walter E. Buck, San Francisco; John F. Humburg, San Francisco.

The capital of the corporation is $1,500,000, 7 per cent cumulative, preferred stock, $100 par value, 30,000 shares common stock, of no par value, which is ample for the size of plant intended and assures of sufficient working capital.

Charles L. Hogan, formerly general manager of the Iola Portland Cement Co., Iola, Kan., which is now operated by the Lehigh Portland Cement Co., has been appointed general manager of the La Compania Cubana de Cemento Portland, with plant at Cayo Mason, Cuba, operated as a subsidiary company of the International Cement Corporation, 347 Madison Ave., New York City. Mr. Hogan will make his new home in Havana, Cuba.

A cement cost accountant wants position. Familiar with all systems and branches of cement accounting. Has installed Portland Cement Association system in five plants. Address J. J. King, Box 835, Route 5, Los Angeles, Calif.

The Security Cement & Lime Company, Hagerstown, Md., have recently installed two additional 42" Fuller Mills in their raw grinding department. This standardizes the equipment for grinding raw material.

The Continental Portland Cement Company, J. C. Josse, superintendent, have recently received 265,000 pounds of Fuller-Lehigh chilled cast iron shell lining plates. This includes two complete sets of Krupp Ball Mill liner plates, together with shell linings, partition and end plates for their 6′ x 22′ tube mills.

The Marquette Cement Manufacturing Company have installed three new 42" Fuller Mills in their Coal Grinding Department. This concern have now 18 of these mills operating in the Raw Department and six in the Coal Department.

In the quarry of the Gulf States Portland Cement Co., Geo. P. Dieckmann, president, Demopolis, Ala., are using the most up-to-date machine for cutting rock, which is known as the Adel rock excavator, with a daily capacity of 500 tons of Selma limestone. It requires a force of only three men to take care of this product. The machine shaves the rock from the sides of the quarry at a depth of 50 ft., and carries a weighing hopper, from which it is transferred to the conveyor belt to the large swing hammer crusher, thence on a 22-in. by 980 ft. rubber belt to a large stone dryer, from the dryer into rock storage. The rock is then drawn from the storage into a set of finish dryers, hence, from dryers into the raw tube mills, where the material is prepared for the rotary kilns.

The Kosmos Portland Cement Co., Kosmosdale, Ky., have completed improvements in their raw mill, where they have changed from engine driven to vertical motor drive, and have electrified many conveyors and elevator drives. Have arranged to have most of the mill shut down on Sundays.

The plant of the British Columbia Cement Co., Bamberton, B. C., H. Anderson, superintendent, which has been closed down since 1916, is being overhauled and will be placed in operation in the spring. The daily capacity is 2,000 barrels and is operated under semi-wet system. The other plant of this company, located at Tod Inlet, B. C., has had an extremely busy year during 1920, primarily due to a large demand for export shipments. The daily capacity of this plant is 3,000 barrels. H. L. Kappenberger is superintendent.

C. J. Reilly has resigned as general superintendent of the Sandusky Cement Company and has accepted a position with the same company to take charge of their cement plant at York, Pa.

The Union Portland Cement Co., R. R. Dorland, superintendent, Devil's Slide, Utah, operate six No. 66 Smidth Kominuters and six No. 18 Smidth tube mills and will install a No. 4 Jumbo Williams mill.

The big blast at the quarry of the Dixie Portland Cement Co., Richard City, Tenn., will be set off according to announcement by an official of the company. The explosion is to be the largest ever set off by the company and is believed to be one of the biggest ever set off.

Twenty-one tons of dynamite will be set off, and the dull thud of the terrific explosion will be felt for miles. The dynamite has been deposited in about fifty holes drilled in the solid rock by Sanderson-Cyclone drills. The dynamite will be set off together.

The explosion will bring down a wall of granite approximately 1,000 feet long by about 125 feet high and 25 feet thick. It is estimated that the explosion will move and break up 350,000 tons of rock, sufficient to run the plant for several months. The dynamite is placed in two rows of holes. Immediately after the explosion, crews will begin work drilling holes for the next blast.

The explosion will make a low, heavy thud as the great wall of rock is lifted into the air, and will be heard for about two miles. The explosion can be felt for a greater distance than that. The blast will cost about $25,000.

Phoenix Portland Cement Co., H. H. Leh, superintendent, Nazareth, Pa., will install a system of conveying rock from the quarry to crushers and mill, and also for clinker-crushing rolls to crush clinker from 3 to ¾ in. size. They have made remarkable changes in the arrangement and equipment of their plant, having installed Compel mills in the finishing end, and a system of conveying pulverized coal by pump in place of elevator and conveyors and by firing dryer by pulverized coal in place of by hand firing. About 10% of belt drives were replaced by chain drives and individual motor drives in place of live-shaft drives.

Cowell Portland Cement Co., Philip S. Taylor, superintendent, Cowell, Calif., expect to install waste heat boilers in the near future. They operate seven kilns, each 7½ by 110 ft., total capacity of which is 4,500 bbls. per day and develope their own electricity, having a 4,500 hp. plant. In their quarry they operate six Sullivan tripod drills.

News of the Concrete Products Factories

The Zanesville Cement Products Co., West Main street, W. S. Jacobs, manager, Zanesville, Ohio, recently organized, capital stock $120,000, have their new factory ready for operation. They will manufacture drain tile, sewer pipes, building blocks and dimension stone. Fifteen men will be employed.

J. H. Woolsoncroft and A. G. Clark, Roberts, Ill., have established a factory to make concrete blocks.

The National Mosaic Tile Co., Mobile, Ala., state that they are in position to fill large orders for Adamantile, a floor tile of excellent quality. The tile are made under hydraulic pressure and supplied in various colors and designs. The company stated that they will co-operate with other products manufacturers and will furnish Adamantile to contractors and products manufacturers for resale. This is one way co-operation can be extended in the industry. It is not to be expected that any one plant will manufacture every concrete product made. On the contrary, specializing in certain lines will lower costs and will improve quality because greater experience will be obtained by the operators in the special lines by working continuously on one product.

Duff A. Abrams, of Lewis Institute, was plied with questions when he addressed the Concrete Products Associations—questions that indicated a keen interest in the right mixes for better concrete. Some of Professor Abrams' remarks are here abstracted:

In concrete pipe we are compelled to use a plastic mixture, while in the smaller products the drier mixtures are more common. The thing that is most striking, I believe, about our investigations is the very important effect of water on the strength of concrete.

We have known that a very great excess of water is injurious to the strength of the concrete, but we were not prepared to find that a very small percentage of excess water exerts a more important effect on the strength than the variation in cement. Consequently, we have come to say that water is by all means the most important factor in any concrete mixture.

If the percentage of the water is increased over and above the amount necessary to give a maximum strength, we find a reduction in strength which is equivalent to two or three times the amount of reduction which will be made by similar changes in the amount of cement used. We have been inclined in the past to feel that the cement is the important factor, that if we insist on a certain mixture, we need pay very little attention to the amount of water used. That is a serious mistake, and the sooner we recognize the fact that the water is the controlling factor, the better off we will be.

Professor Abrams lays stress on the amount of water in a mix. Do you feel that a poured mix will not be as good as a tamped mix?

I think there is no doubt that the poured mix in 99 cases out of 100 contains more water than is good for the concrete. You must put in an excess of water in order to get the mix sufficiently plastic so that it can be poured. The best results so far as I know will be produced by concrete which will flush a small quantity of water to the surface after a very light tamping. It is not necessary to pound the concrete or anything of that sort, but in general in all the poured concrete work I have seen—and I am speaking of products particulary—the quantity of water has been very greatly in excess of the amount that would be used if the concrete weren't poured. In that respect the concrete is weaker, and inferior, to what would be obtained by the drier mixture.

Professor Abrams was asked about crushed limestone mixes, compared with gravel.

We have not studied limestone mixtures with a view to getting information on exactly the point mentioned. Crushed stone will make an entirely satisfactory concrete. Care must be taken, however, to see that the mixture is properly made up. The tendency in crushed rocks of this kind is always to produce an excess of coarse material and an excess of fine material, with very little of the intermediate sizes. Sometimes the quantity of fine material is decidedly restricted so that in many cases poor results have been secured from this material due to improper grading, and not all due to any particular characteristics of the limestone. This material, if properly graded, will make an entirely satisfactory concrete for any concrete product, and there is no reason why it should not be used.

Somebody asked Prof. Duff A. Abrams whether or not it is possible in curing wet poured concrete with dry heat to apply too much heat. Mr. Abrams pointed out that the tendency in poured concrete is to use more water than is necessary and that as a consequence the resulting product is inferior.

It was also pointed out, however, that no matter what the concrete is in consistency at the start, it should retain sufficient water to permit proper curing, and that in dry heat you are very likely to dry out all the water and consequently secure a much poorer concrete than you would otherwise have by natural methods of curing.

He mentioned some work done in New Mexico and Arizona, where concrete buildings were ruined by the failure of the builders to take proper care of the structure and protect it against the terrific heat so that it might dry and harden slowly. While the work was done by the most approved methods, with excellent workmanship, the concrete was left unprotected to dry out under excessive heat, and the result was a concrete having a strength at the end of a month about the same as should have been obtained in three or four days. That was because the water was removed from the concrete too rapidly.

Ideal Concrete Machinery Co., 1318 Monmouth street, Cincinnati, O., manufactures molds for making concrete fence posts. Concrete is poured into the molds and spaded so as to exclude the air. The mold is then left for the concrete to set until posts can be removed and further cured. Forms are usually sold in a battery or set of six. With the forms are included stands and staple benders. Staples are imbedded in the posts when the posts are poured. Forms are furnished in either 7 or 7½ ft. lengths. Posts are triangular in cross section and are larger at the bottom than at the top. Further details ma ybe obtained by writing to the manufacturer.

The Automatic Sealing Vault Co., 216 East River street, Peru, Ind., have a proposition to unfold to responsible concerns which offers unparalleled opportunities in field of business and margin of profit. If you are interested in starting a side line that will some day prove more

profitable than your entire present business write them regarding their 1921 concrete burial vault proposition.

The Helm-Lewis Cement Block Co., Indianapolis, Ind., was recently incorporated, capital $10,000. The directors are C. A. Helm, E. L. Selvage, L. W. Lewis and T. R. Lewis.

Ideal Concrete Machinery Co., 1318 Monmouth street, Cincinnati, has about ready for the market a complete Automatic Block Producing Machine, which can be built up from an Ideal hand machine. This equipment consists of the Ideal Block Machine, Ideal Power Tamper, Ideal Core Actuator, Ideal Scraper and Finisher, Ideal Conveyor and Feeder and the new Ideal Automatic Cam Attachment. You will recognize that everything with the exception of the new attachment is our old, well-tried Ideal Power Equipment, writes A. Niehaus, sales manager.

However, by means of the old Ideal Equipment it required 23 manual and pedal operations for the production of a block. By means of the new cam attachment, these 23 motions are reduced to one single motion; simply pulling out the starting lever. The machine then automatically feeds in the material and produces a block in 12 seconds, and then stops. Then as the block is removed and another pallet is placed in the machine, the lever is again pulled, producing another block in the same time.

This method of producing an automatic machine has two distinct advantages: In the first place, that of using the well-tried principles of Ideal machinery, which has been successfully manufactured for the last 12 years. In the second place, it is possible for any Ideal customer to obtain a completely automatic block machine without sacrificing any previous equipment that he has purchased. If a man has an Ideal hand block machine only, he can build up from there on. If he has a hand block machine and tamper, he has that much less equipment to purchase for a complete automatic attachment.

Furthermore, the Ideal equipment has always been known for the production of a thoroughly square, true block, and particularly well adapted to face blocks and corner blocks. These advantages of the machine all maintain in the automatic outfit.

The Michigan Silo Co., Kalamazoo, Mich., established a record for quantity output for one year when it completed 900 cement stave silos in 1920. Kent continuous mixers are used exclusively in their factories.

The Besser Sales Co., 1302 21st street, Alpena, Mich., are now prepared to furnish hand hollow building tile machines in four models which will make the standard 5x8x12 and 5x12x12″ sizes as well as the special sizes ordinarily used.

In connection with their power machines for the manufacture of hollow building tile, which turn out the standard sizes mentioned above in large quantity, this gives a rounded equipment which permits of the making of all the wanted special sizes and shapes for corners, jambs, closures, etc. These special sizes and shapes can be made on the hand machines in sufficient quantity for normal requirements without interfering with the high speed production of the power machine.

The Cinder Products Corporation, 79 Richmond avenue, Lockport, N. Y., has been organized to manufacture concrete brick by a new process. The Wilson Concrete Products Corporation of Lockport, N. Y., who have just completed a new plant (using Besser machines and mixers) with a capacity of 30,000 concrete brick per ten hour day, are using this new process. The Wilson Corporation have territorial rights to manufacture and sell in the New York counties of Erie, Niagara and Orleans and also will handle the erection and placing of factories in all parts of the United States and Canada, and will furnish operators to manage the production of products, for which the local factory will be used to teach men to be skilled operators.

An agreement which is about to be closed with one of the largest machinery sales companies in the country will handle equipment of all factories.

Mr. Sigurd Bo, the inventor, is a Norwegian by birth and has spent eight years perfecting this process, which consists of the removal of all inflammable materials from cinders, crushing the cinders which have been through fire, then treating the crushed particles to remove the acids which are detrimental to building materials, and the addition of cement in proper quantities. All kinds of building materials, such as brick, tile block, plaster, stucco, in fact anything in which concrete is used, can be made by this process. These products can be used for and will stand a greater test in all ways than sand, gravel or crushed stone concretes.

Starting this month, the Roguemore Cast Stone Co. of Buffalo, N. Y., will produce 30,000 cinder brick per day. This company has been granted the right by the Wilson Concrete Products Corporation to manufacture and sell in the city of Buffalo, N. Y.

The city building department of Detroit permits the use of concrete chimney block. No flue lining required. The approval and acceptance is ample assurance of the fireproof qualities of concrete chimney block as well as desirability in every other particular. Their use affords a definite saving in cost of material and construction.

The Saffert-Gugisberg Co., New Ulm, Minn., is planning not to be caught without sufficient cement in the future to keep their concrete products plant in full operation. Four cement stave silos have been erected at the plant and these large receptacles, with a capacity of from 80 to 100 cars, will be filled with bulk cement. These silos are 18 feet in diameter and 50 feet high.

During the past year considerable time has been lost on account of the wide-spread condition, which curtailed the furnishing of sufficient cement to keep the plant in operation. At times the plant had to close because of the lack of this product and the employes were laid off. This status worked a considerable hardship and they are now making good use of the famous silos manufactured by the company to avert a like condition in the future.

The Pipestone Cement Products Co., B. Naeve, proprietor, Pipestone, Minn., whose plant was closed down June 15, on account of the cement famine, has been reopened. A new boiler has been installed for curing rooms. Blocks, cement stairs, chimney blocks and drain tile are made in this factory, which employs ten men.

The Nelson Concrete Culvert Co., Hattiesburg, Miss., recently incorporated, capital $100,000, have erected a new factory. Home office, Pontiac, Ill.

The revival of building has induced Richard Nodurft, Lyons, Kansas, to reopen his cement block factory and he is now turning out blocks in large numbers. Richard Carter will be associated with Nodurft in the business.

A Bright Future Looms Up for the Building Industry in 1921

ARRANGE TO-DAY TO GET YOUR

Helm Brick & Block Press

Bricks and blocks produced on a HELM PRESS are the finest looking and the most permanent, because the machine comes down with a pressure of 40 tons on the medium wet concrete, which welds all the elements of these materials so as to be able to resist fire, moisture, wear and tear.

Another reason why you should buy a Helm Machine is that your production is unlimited—you can turn out 15,000 brick or 1,500 24-in. blocks in a day if you wish.

And finally, the Helm Press is built to last—to produce for you year after year without complaint, without repairs.

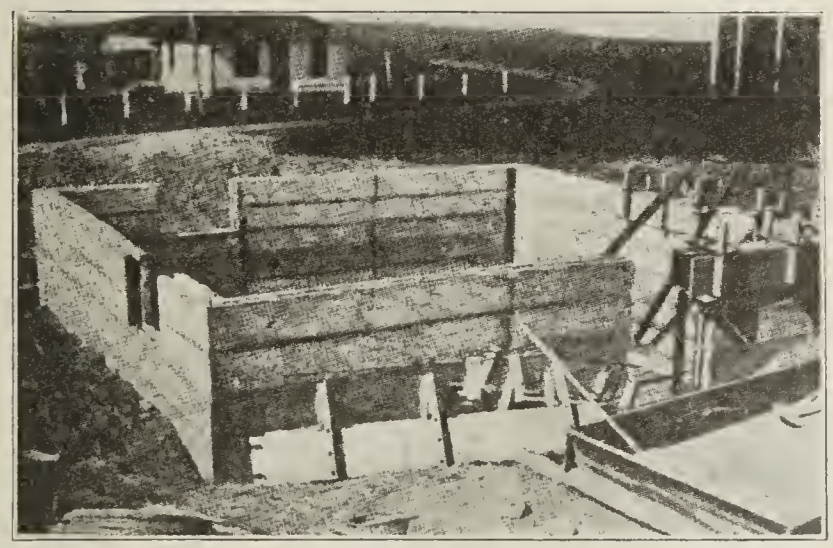
Write for Free Book on Successful Brick and Block Making

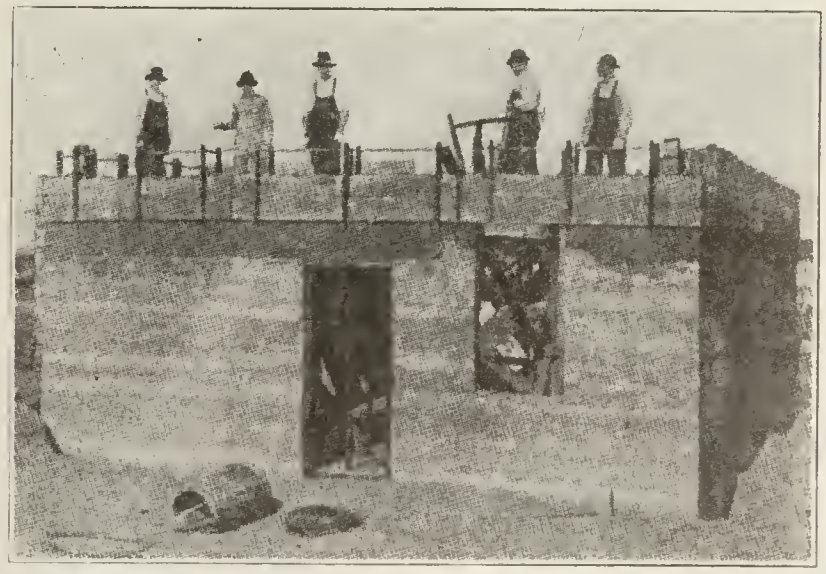
The Helm Brick Machine Company

763 Mitchell St., Cadillac, Mich.

FROST HOLLOW WALL FORMS

ADJUSTABLE TO ANY KIND OR SIZE OF BUILDING





With our forms you can build a double wall, reinforced concrete building to compete with the cost of frame construction.

Moisture-proof, fire-proof, repair-proof walls. Save paint, lath, time and labor to you. Save repair, fuel and insurance to the owner.

Forms adaptable to any size building, adjustable to any thickness wall. Built of poured concrete, reinforced three ways with continuous dead air space makes the most desirable method of building construction. Simple to use, easily adjustable. No skilled labor required. Method has been tried and proven.

Write for complete description of method and its operation, photos showing work done, and costs.

HOLLOW CONCRETE WALL CO.

H. T. FROST, PRESIDENT — MITCHELL, SOUTH DAKOTA

Dodge Electric Generating Apparatus

One of the latest and most notable developments of the Dodge Sales & Engineering Company of Mishawaka, Indiana, consists of complete power units for electric generating. The units as made by this organization involve no freak ideas or pet hobbies. Every test made on the complete unit is made in strict accordance with the rules adopted by the American Institute of Electrical Engineers.

The generating units are made up either direct connected or belted in all standard voltages using Dodge Heavy Oil Engines as motive power. The sizes manufactured at present range from 12½ H. P. to and including 75 H. P. The wide range of sizes in these outfits makes the fact evident that the power units are equally adaptable to either marine or stationary power plant service.

Dodge Heavy Oil Engine Used as Prime Mover

The Dodge Heavy Oil Engine used is sufficient guarantee of low cost operation which, of course, results in a great saving in the cost of current generation.

The Dodge Heavy Oil Engine is sold under a standard guarantee which specifies a consumption of fuel oil of .5 lb. per B. H. P. hour, using fuel as low as .28 Baume, containing not less than 18,500 B. T. U. per pound. In fact every Dodge Heavy Oil Engine turned out must use less than the amount guaranteed on actual brake test; otherwise such a guarantee could not be made with any degree of safety.

A Cost Comparison

The engine illustrated herewith has a break output of 50 H. P., and is direct connected to a 30 K. W., 220 Volt, D. C. generator, running at a normal speed of 425 R. P. M. It would therefore use 10,000 gallons of fuel oil per year, if operated 10 hours a day under full load for 300 days. This fuel costs on the average of 5 cents a gallon and would mean a total of $500 for annual fuel cost. This reduces the fuel cost of current to $.005 per K. W. hour. A comparative cost table prepared by the Dodge Sales & Engineering Co., clearly indicates the economy of the operation of the Dodge Heavy Oil Engine in direct comparison with coal, kerosene or gasoline engine fuel.

Some interesting conclusions are definitely and accurately arrived at in this table. For example, it is found that operating under the same period with a simple steam engine would increase the fuel cost to $1,755 with a resultant fuel cost of $.0157 per K. W. hour. The table also contains figures relating to the operating cost of internal combustion engines of the same horse power rating and using both kerosene and gasoline as fuel.

Construction of Generator

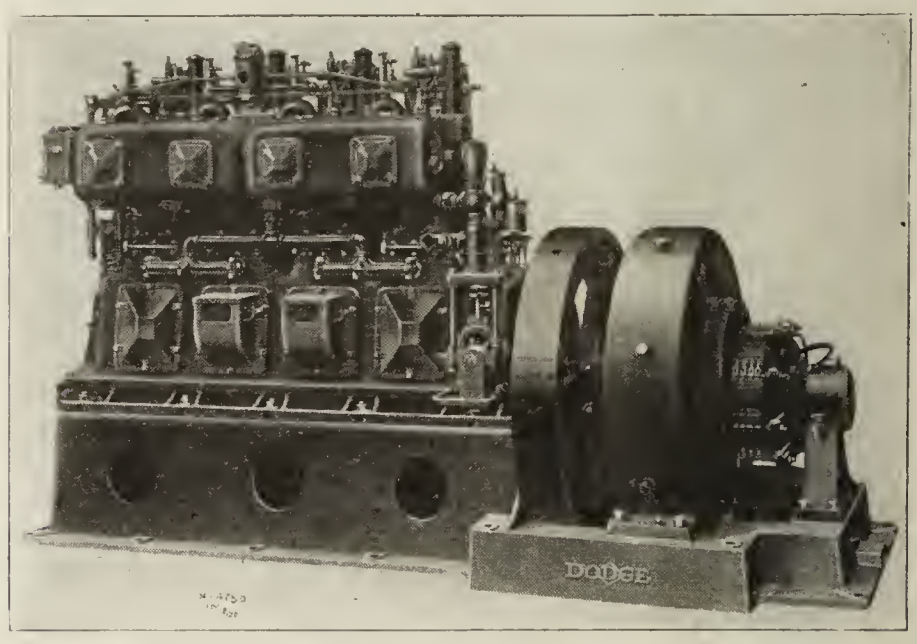
The generator used has been developed especially for this particular service by the Engberg Electrical & Mechanical Works at St. Joseph, Michigan. The armature is of the iron clad ventilated type, with laminated core, being built of electrical sheet steel, thoroughly japanned before assembling. The drum and core are provided with air ducts, permitting a thorough circulation of air through same.

Nothing but the very best double-covered magnet wire of the highest conductively is used, and the insulation is thoroughly waterproof. A very desirable feature in connection with the armature is that it has been so designed as to eliminate a coupling on the armature shaft, the crankshaft coupling is direct connected to the armature drum, by such construction that the engine drives through the armature and not on the armature shaft. This method of construction is very substantial and makes it very easy to remove the armature—in fact this can be done without disturbing the engine in any manner whatever. Close regulation is assured by having the flywheel of the engine located close-up to the armature and on the same end of the crankshaft.

The Commutator

The commutator is made of copper bars, insulated with the best grade of mica plate and is very heavy, thus insuring years of continuous operation without need of renewal. It is built up on a separate sleeve and bolted to the armature drum, so that the shaft can be removed without disturbing the windings. The bars are collected in a steel chuck, especially designed for this particular purpose, which is provided with large steel screws. The chuck is heated and allowed to expand, at which time screws are tightened to the very extreme. When the chuck cools and shrinks, the commutator is drawn into a perfect and lasting position.

Every part of both the Dodge Heavy Oil Engine and the generator is of the highest possible grade in regard



to material, workmanship and design. All bearings are extremely large and accurately fitted, thus assuring smooth and constant operation with comparatively little attention.

A thorough investigation is convincing that the Dodge Sales & Engineering Company have combined every possible necessary feature which makes for continuous, satisfactory and economical performance in these units.

Both engine and generator is carefully tested and inspected at frequent intervals during the course of construction. Both are mounted on a heavy cast iron sub-base and dowelled in place, after which they are subjected to a final operating test under load.

Every detail has become standard through public approval and after demonstrating its excellence by continuous, efficient and satisfactory service. Every precaution has been exercised in the designing and building of these units to eliminate all complication without sacrificing a single feature which adds to the endurance and reliability so necessary to hard and continuous service.

An indication that concerns requiring electrical generating apparatus have not been slow in appreciating the great economy effected in the use of oil driven generating sets is evidenced by the number of orders that have been placed for the units illustrated.

EXPLOSIVES ~ SERVICE

Saving the Users of Explosives Over $1,000,000 Every Year

BY developing new types of explosives that are more efficient and more economical than those of yesterday, our staff of over 300 chemical engineers have made possible a very substantial saving to users of explosives.

The two most notable developments in the explosives industry since the introduction of dynamite in 1866—low-freezing ammonia and permissible powders—came from the Du Pont Laboratories, where constant efforts are still being made to bring them to a still higher state of perfection.

The introduction of these two powders is saving explosives users *one cent* a pound on approximately 100,000,000 pounds a year, for not only is their cost less on the basis of equal nitroglycerin content, but lower "strength" of these powders can be used to accomplish equal results. Besides contributing to economical use of explosives, these powders have reduced the hazards to life and property to a very large degree, resulting in the saving of a vastly greater sum.

Constant research and improvement is merely one phase of Du Pont Explosives Service. Vast facilities for production, supervision hitherto unknown in point of accuracy to insure uniform high quality, a great chain of distributing magazines, a fine force of *practical* explosives experts in the field combine to make a Service complete in every detail.

We suggest that you take advantage of Du Pont Explosives Service in *your* work—as so many thousands of others have done in their work.

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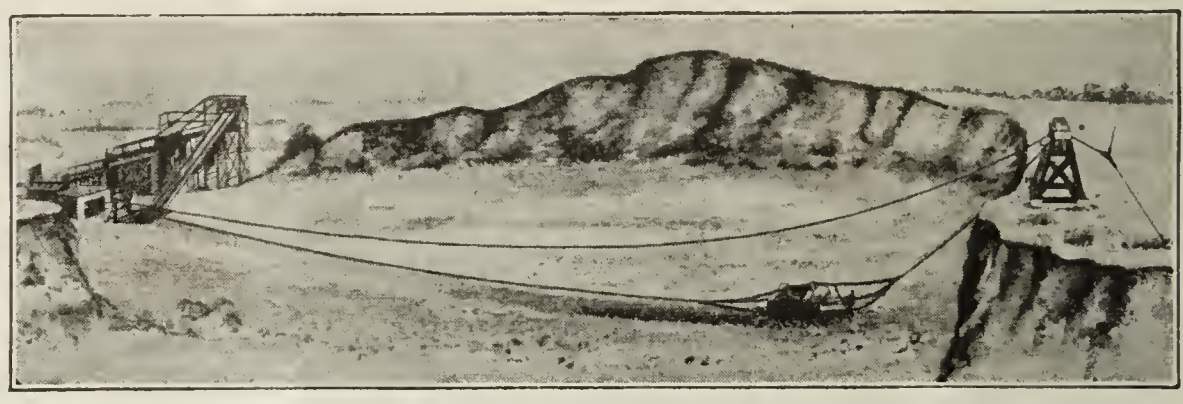
SAUERMAN BOTTOMLESS POWER SCRAPERS ARE LABOR-SAVERS FOR SMALL GRAVEL PITS

Conservative claims for the smallest sizes of Sauerman Bottomless Power Scrapers, based on the statements of contractors and county road commissioners who are using them, are that a Sauerman scraper operated by one man will displace from 6 to 15 teams and slip scrapers. The larger sizes of Sauerman scrapers are considered by the commercial gravel producers who use them as being the equal of a small steam shovel with the added advantage that they will not only dig, but also convey the sand and gravel to the plant.

One road superintendent in Michigan who installed one of our ⅓ cu. yd. scrapers in the county gravel pit last Summer, writes in to say that it is saving the county $40.00 per day while doing the work that formerly called for a half dozen teams and scrapers.

A Wisconsin sand and gravel producer chose a Sauerman scraper in preference to any other type of equipment when he opened his first gravel pit about six years ago. Today he owns and operates four gravel plants and the excavating and conveying equipment is the same at all—Sauerman Bottomless Power Scrapers.

The many advantages of this one-man operated, combined excavator and conveyor are explained in our Pamphlet No. 10, with illustrations and diagrams of actual installations. Write for this booklet today.



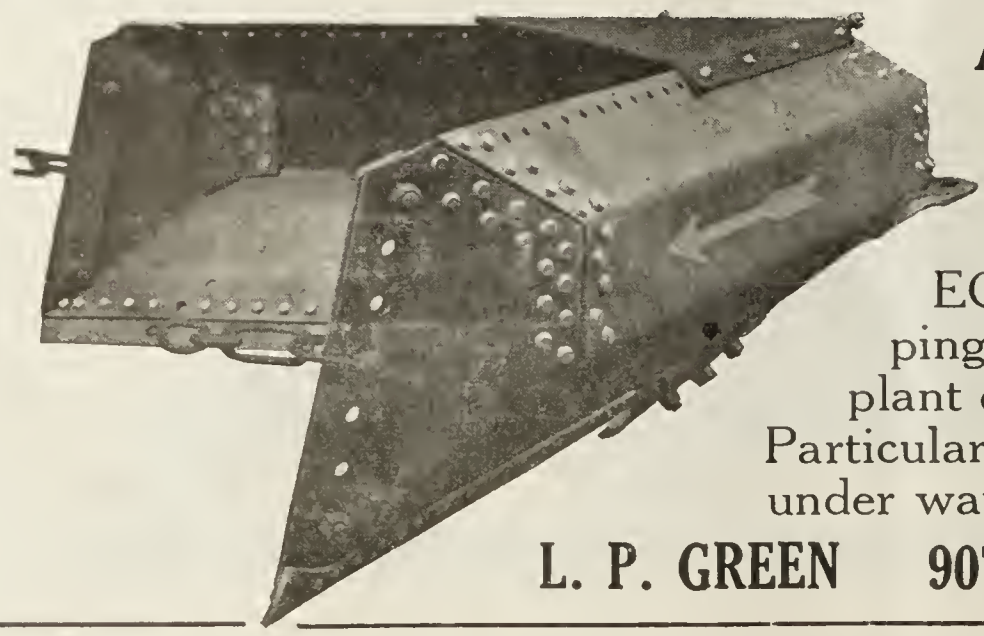
Typical installation of Sauerman Power Scraper for hillside gravel pits.

Also, for Handling Coal

We manufacture a special type of bottomless power scraper (shown below), that is extensively used for storing and reclaiming coal and similar loose materials. Full description on request.

Sauerman Bros., 1139 Monadnock Block, Chicago

Also Manufacturers of Sauerman Dragline Cableway Excavators



ARROW POWER DRAG SCRAPER

A Real Earth Mover

Operated by two drum hoist. It will do excavating work of all kinds ECONOMICALLY. Grading—Stripping—Delivery of material from pit to plant or bins or for wagon or truck loading. Particularly adapted to hillside deposits or under water. Write for catalog.

L. P. GREEN 907 Lumber Exchange Bldg. Chicago

CLOSED—For Storing or Transporting.

ECONOMY STEEL SCAFFOLDING

is being used by a number of leading Chicago contractors, such as Thompson Starrett Co., R. C. Wieboldt, Blome Sinek, E. W. Sproul & Co., Math Rauen Co., Gerhardt Meyne and many others, who will gladly recommend them to every contractor as a good asset in equipment.

The illustration is of the Mason Horse 4 ft. 6 in. high and 5 ft. 0 in. wide which weighs but 60 lbs., they are sturdy in construction and their compactfulness when folded makes them very easy to handle, transport or store.

A TRIAL ORDER WILL CONVINCE YOU THAT THEY ARE A NECESSITY.

Price $6.00 each, F. O. B. Chicago.

ECONOMY SCAFFOLD CO.

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MIXER
For Quick Sale

½-yard Smith Tilting Mixer, on trucks, 8 hp. Steam Engine, 10 hp. Boiler, equipped with Auxiliary Hoisting Drum of 2,000 lbs. capacity.

F. O. B. Milwaukee, Wis. . . .$1,000.00

Boehck-Lowe Machinery Co.
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Start with accurate lists of names we furnish—build solidly. Choose from the following or any others desired.

Apron Mfrs.	Wealthy Men	Fly Paper Mfrs.
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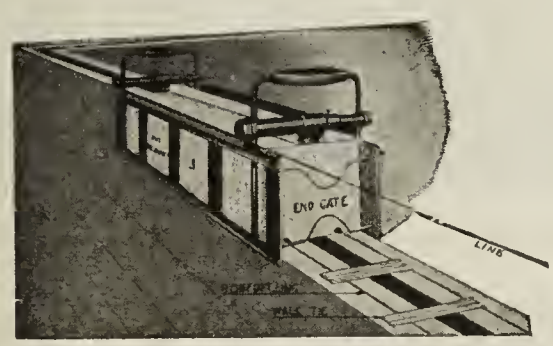
Our complete book of mailing statistics on 7000 classes of prospective customers for the asking. You need it.

Ross-Gould, 455C N. 9th Street, St. Louis.

ROSS-GOULD Mailing Lists St. Louis

Build the Hollow Wall Way

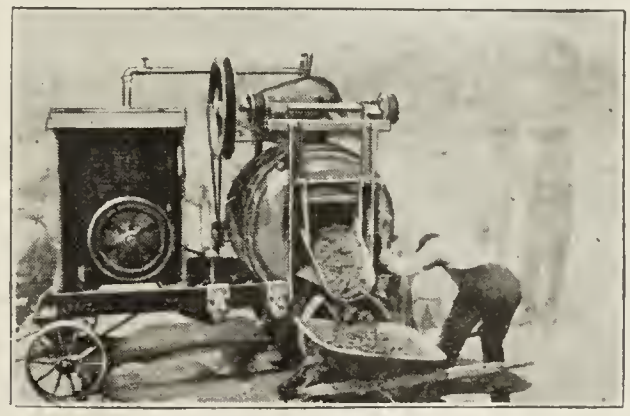


Like a thermos bottle—warmest in winter—coolest in summer. Fire-proof—everlasting.

Cheapest, best and most perfect way known to the building world.

The reason the most wall can be built for the least money with our forms is—because they are STRONGEST—LIGHTEST—SIMPLEST and MOST PERFECT, and the price of a complete set can be saved on one small job. Send for literature.

The Universal Cement Mold Co.
North Milwaukee **Wisconsin**



THE *Atlas* MIXER

Represents the best established practice in Concrete Mixer Construction.

Its dependability and simplicity commends it to the contractor who appreciates the importance of uninterrupted service.

The Atlas is made in various sizes and styles. Let us mail you our catalogue.

Send for it today—NOW

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P. S.—If you are interested in material handling equipment, let us mail you our ATLAS Wagon Loader, Box Car Loader, Car Unloader, Belt and Bucket Conveyor and Portable Storage Bin catalogue. The catalogue is yours, simply ask for it.

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PURIFICATION SYSTEMS
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FOR BOILER FEED AND
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(Canvas Stitched)
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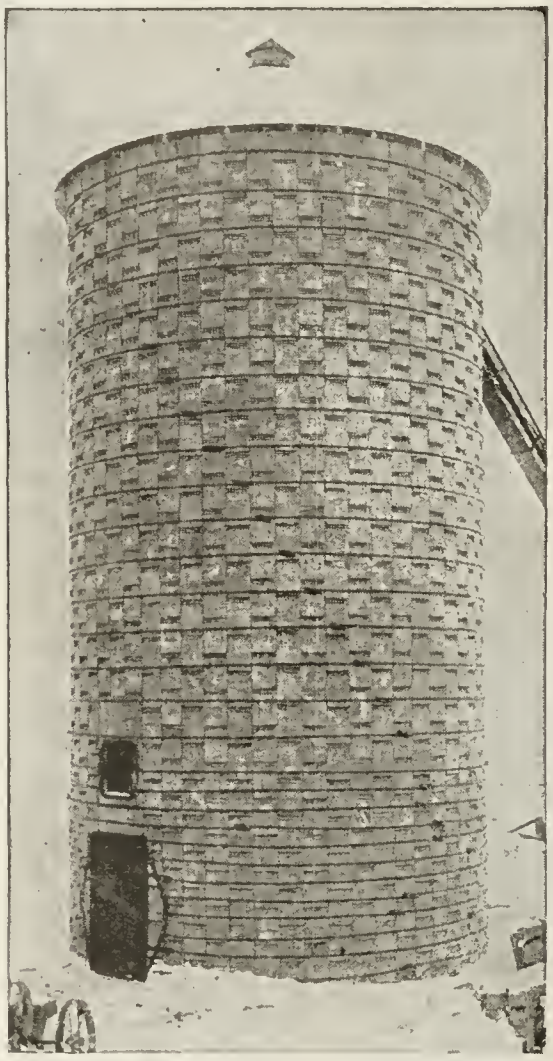
THE IREY SUCCESSFUL AND ECONOMICAL METHOD OF CONSTRUCTION



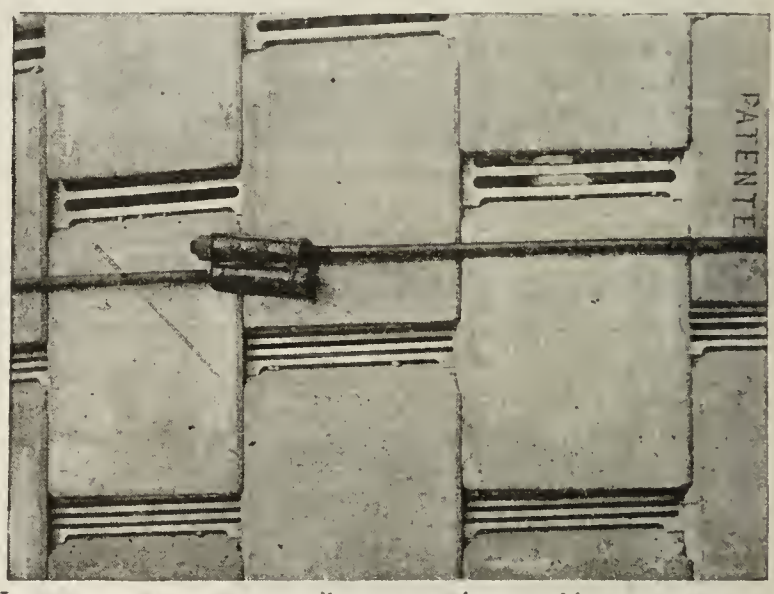
Irey cement stave corn crib on the farm of W. W. Walters, Wiota, Iowa—a fireproof, ratproof and permanent structure.

Gives every rural contractor an opportunity to take advantage of the large demand for better Corn Cribs. Every farmer is a prospect for a concrete crib.

THE IREY PATENTED VENTILATED CONCRETE STAVE CORN CRIBS

are so built as to admit air and exclude rain and snow.

Making the staves is simple. Erection rapid. Every farmer is a booster. Any concrete man can establish a good paying business manufacturing and erecting these cribs. Investigate our proposition. Write for details.



Irey cement stave corn crib construction combines permanence and ease of operation with ample circulation through the contents.

CONCRETE PRODUCTS CORP.

WEST LIBERTY, IA.

For FIRE BRICK and DUST

Specify

CRESCENT QUALITY

THE UTMOST IN
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CRESCENT REFRACTORIES CO.

Curwensville, Clearfield Co., Pa.

"HERCULES SOLID WELD"
STEAM SHOVEL CHAIN

The Chain that puts the SHOVE in Steam SHOVELS

MADE ONLY BY

THE COLUMBUS McKINNON CHAIN CO.

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THE KENT CONTINUOUS MIXER

IS THE BEST MADE FOR USE IN

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because of its many labor-saving features.

Equipped with automatic feeding device, it makes certain a proper proportioning of aggregates and being continuous in operation it saves time and labor. The biggest concrete products plant in the world has found that four Kent machines will mix fast enough to keep its many tampers and molds machines busy.

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Reichert Metal Forms

for Concrete Construction (both straight and circular) are equipped with the patented REICHERT Improved Locking Device.

This Lock operates flat against the wall of the unit. Space is saved—less excavation required. It also prevents spreading and breaking apart of units. It is made of steel; operates easily; no hammering required to lock or unlock.

Ask for catalog and full facts about REICHERT Metal Concrete Forms.

REICHERT METAL CONCRETE FORMS CO.

1188-1200 Weil St., Milwaukee, Wis.

THE POLK SYSTEM

All-Steel Machines for All Kinds of

Circular Concrete Construction

We contract grain storages.

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210 to 214 South Fourth Street, ST. LOUIS, MO.

We make a specialty of supplying cement works with

Chemical Apparatus, Chemicals and Reagents

Gilmore's Needles, Cement Moulds, Vicat Apparatus, Schumann's, LeChatelier's and Jackson's Specific Gravity Apparatus, Etc.

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High Grade Goods Only

Satisfaction Guaranteed

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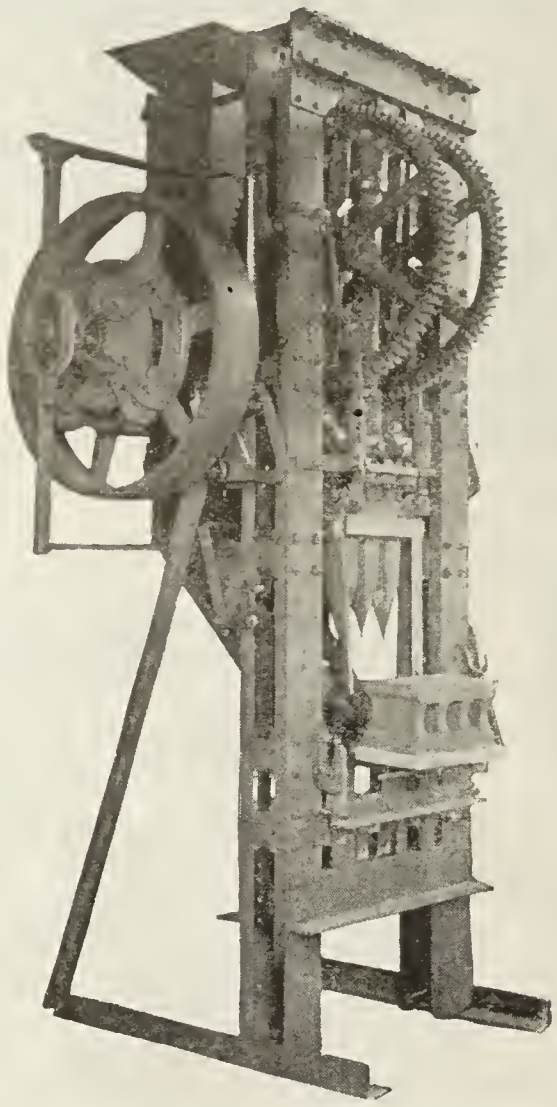


Introducing an absolutely new and original method of manufacturing concrete blocks. ALL AUTOMATIC. Each stroke of the plungers makes and delivers a complete block—a block which is dense, true and easy to lay. A guaranteed output of over 2000 blocks per day with four men. No other equipment will give you this production per man.

We also manufacture the following well known machines:

The Hobbs Down Face Block Machine

The Anchor Continuous Air Space Block Machine

The Anchor Automatic Tamper made to operate over any type of block, brick or stave machine.

The Anchor Batch Mixer—a mixer designed for concrete products plants.

Let us tell you more about this reliable line of equipment.

The Anchor Concrete Machinery Co.

Home Office: Rock Rapids, Ia. Branch: Columbus, O.

Building Material of Beauty

Minimum absorption, maximum strength, light and easy to lay and produced in style, shape and design to meet any architectural requirements.

INEXPENSIVE **PERMANENT** **POPULAR**

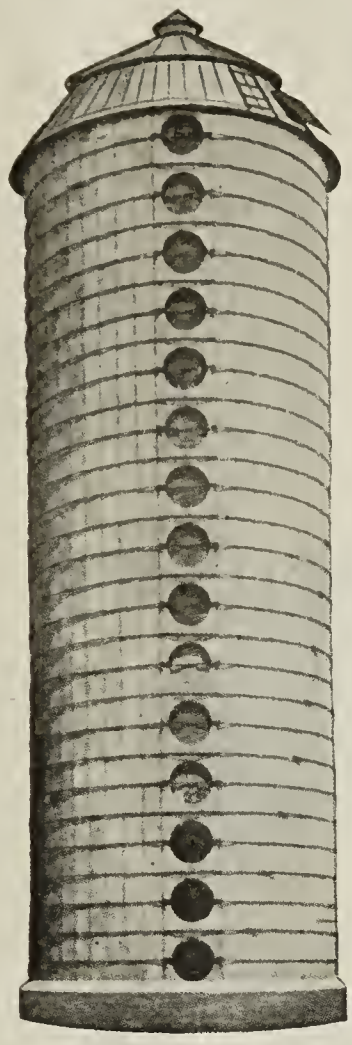
Under one operation the stone are veneered with granite, marble or other natural products and sprayed as they come from the machine, producing a Reconstructed Stone in natures own beauty.

AN OPPORTUNITY

If you are interested in producing a high class building unit of standardized dimension, and desire to invest in a Real Manufacturing Business, WRITE US NOW.

HYDRAULIC RAMMING CONCRETE STONE MACHINERY

LITTLE FALLS **NEW JERSEY**



Silo Hardware?

—*let Pierce furnish it!*

Cut the high cost of worrying, Mr. Silo Man, by getting a Pierce catalog and ordering all your silo accessories from one house. Put the responsibility on us—just as hundreds of other silo builders have done—and you'll get what you want when you want it.

Silo Rods	Round Metal Doors	Reinforcing Bars
Lugs	Wood Doors	Eye Bolts
Wrenches, Ratchet	Steel Door Frames and Doors	Hook Bolts
Black and Galvanized Sheets	Steel Arches	Base Anchors
Angles, Beams, Channels	Steel Ladders	Metal Roofs
	Door Fasteners	Metal Chutes
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The Pierce Company

(Division-Pierce Products Co.)

Waldheim Bldg.
Kansas City, Mo.

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Medusa White Cement *Keeps* Its Whiteness

You can depend on results when you use Medusa Stainless White Cement—whether in special trim as shown here, for stucco, for laying face brick, or for any other cement work where permanent freshness and color values count.

With the addition of Medusa Waterproofing, your work can be made moisture-proof for all time. We furnish cement already waterproofed, or supply the waterproofing separately.

Booklets gladly sent upon request

THE SANDUSKY CEMENT COMPANY

Department E — Cleveland, Ohio

Ask to have your name placed upon the complimentary mailing list of "The Medusa Review."

MEDUSA Stainless White Cement

Concrete Blocks, Bricks Building Trim, Posts, Ornamental Work, Etc.

WHEN FACED WITH

Mica Spar Crystals

IS CHANGED INTO

SPARKLING GRANITE

Beautiful, Artistic and Everlasting

Made in six scientifically milled sizes, extremely hard, sharp and free from dust. Insures strength and beauty. Booklet "Micaspar and How to Use It," with free samples mailed on request.

Crown Point Spar Company, Inc.

663-665 BROADWAY — NEW YORK

For Better Concrete, Stronger Mortar—use HYDRATED LIME

Increases Concrete Density

By virtue of its ability to fill the voids, Hydrated Lime increases the density of concrete. The mass becomes more watertight—practically impervious to water. Honeycomb and other structural weakness are also prevented. Hydrated Lime promotes intimate contact of the concrete mass with the forms and produces smooth, pleasing exterior surfaces.

Other Reasons Why You Should Specify and Use Hydrated Lime

because

1. Makes the mixing of Portland cement concrete more easy, inasmuch as it lubricates the sand grains and coarse aggregates.
2. Renders the concrete mix plastic enough to flow freely and smoothly with a minimum of excess water.
3. Makes the concrete easier to work after it is deposited in the forms, thus eliminating labor usually required for spading and tamping against the forms.
4. Eliminates the tendency toward cracking, because it minimizes alternate expansion and contraction due to moisture changes.
5. Promotes uniformity of the mass concrete by producing a colloidal or jelly-like medium through which the rock and matrix do not segregate, thereby producing a stronger concrete.
6. Materially and directly increases the ultimate compressive strength and efficiency of the concrete, by virtue of its ability to hold water in mechanical suspension and thus supplying the necessary moisture required by Portland cement in order properly to set and attain its maximum strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

Ladd Lime & Stone Co., Cartersville, Ga.

Glencoe Lime & Cement Co., St. Louis, Mo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

Merion Lime & Stone Co., Norristown, Pa.

Marblehead Lime Co., Chicago—Kansas City

Ste. Genevieve Lime Co., St. Louis, Mo.

National Lime & Stone Co., Carey, Ohio

American Lime & Stone Co., Tyrone, Pa.

Lee Lime Co., Lee, Mass.

Rockland&RockportLimeCorp. New York—Rockland, Maine—Boston

Ohio Hydrate & Supply Co., Woodville, Ohio

Vermarco Lime Co., West Rutland, Vt.

White Marble Lime Co., Manistique, Mich.

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

Woodville Lime Products Co., Toledo, Ohio

Western Lime & Cement Co., Milwaukee, Wis.

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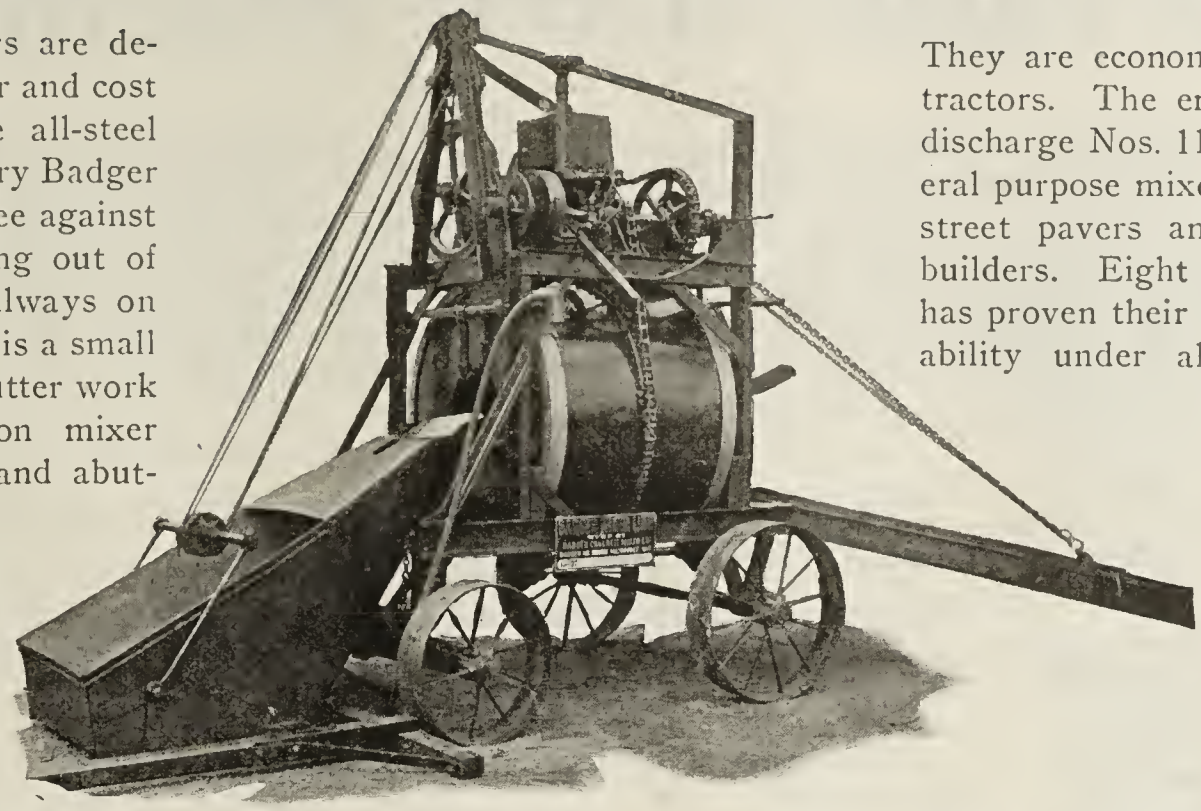

They are economical to the contractors. The end load and end discharge Nos. 11 and 15 are general purpose mixers and alley and street pavers and country road builders. Eight years of service has proven their absolute dependability under all conditions of concrete work.

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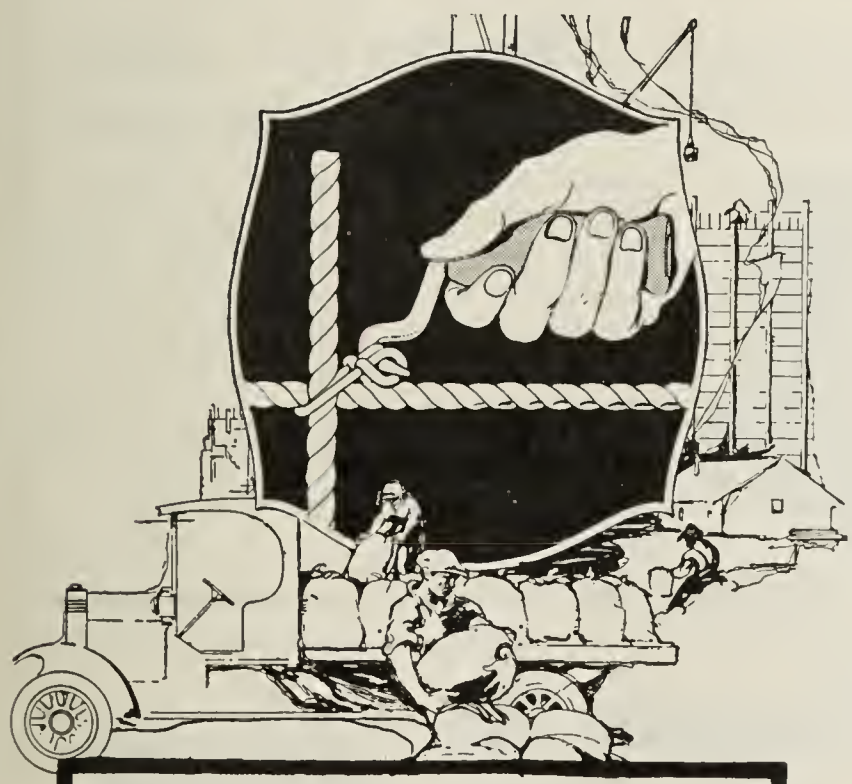
BADGER CONCRETE MIXER CO., 13th Floor MAJESTIC BLDG. **MILWAUKEE, WIS.**



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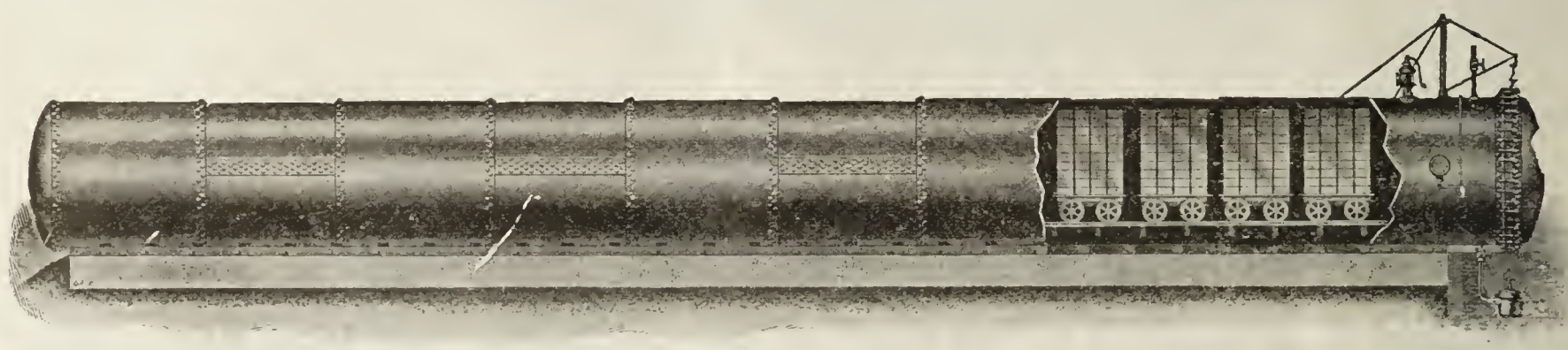

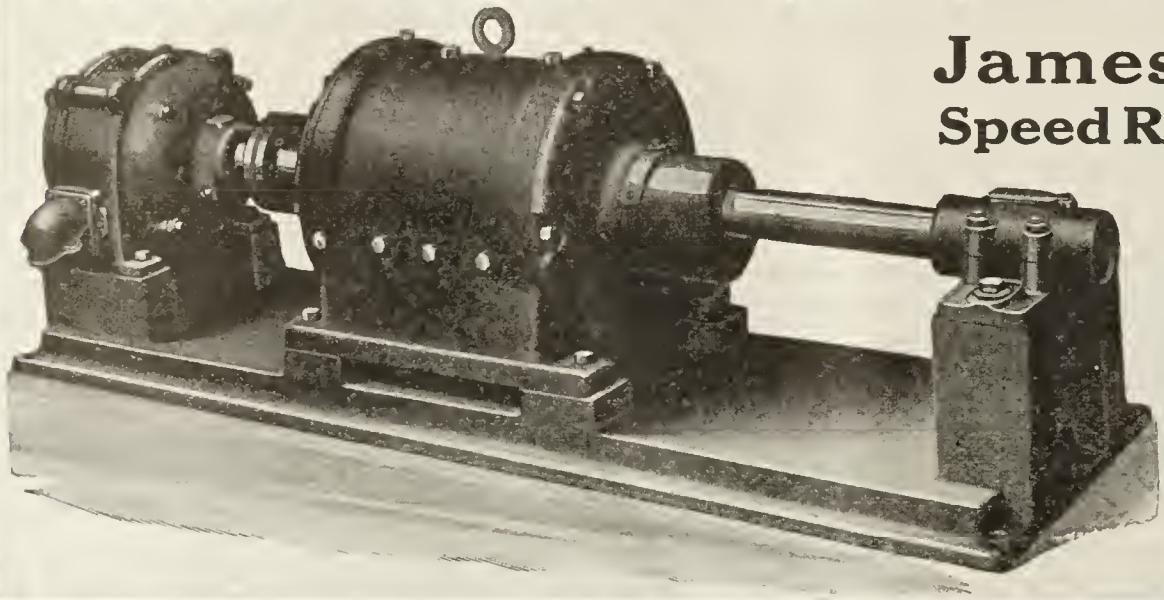

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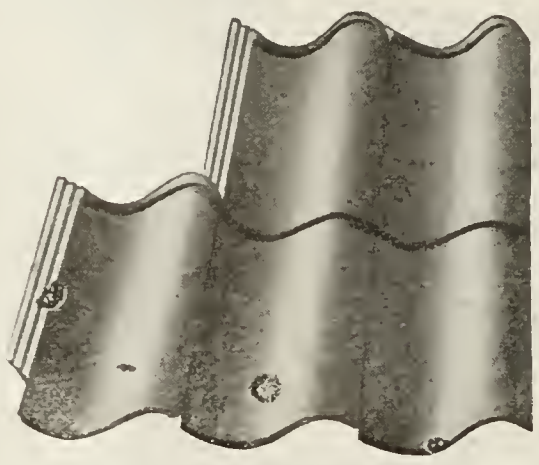

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Write for description and prices.

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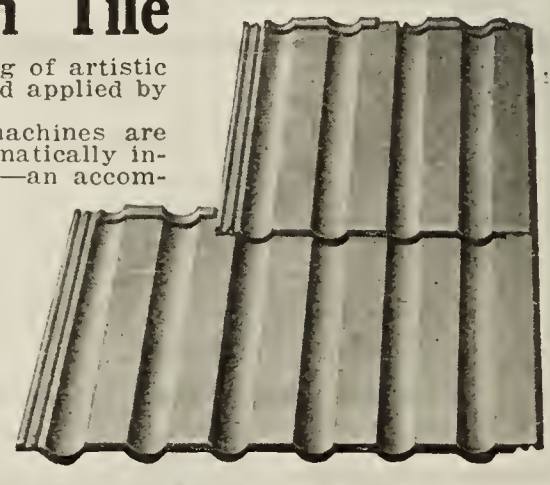

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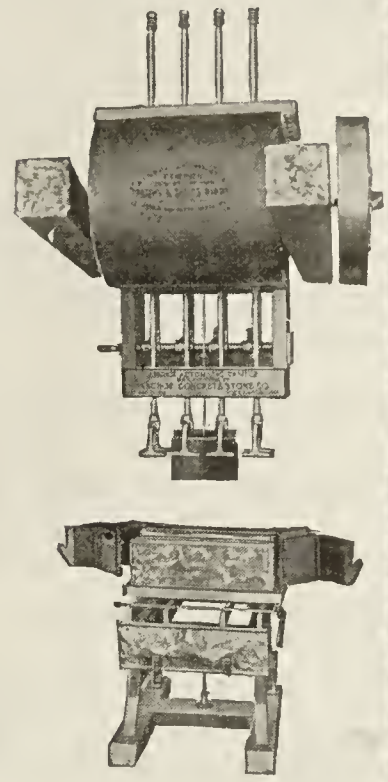

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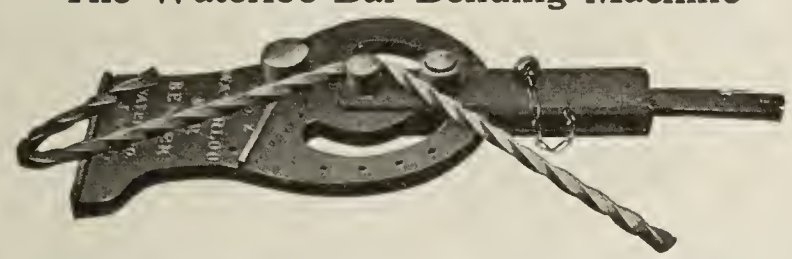

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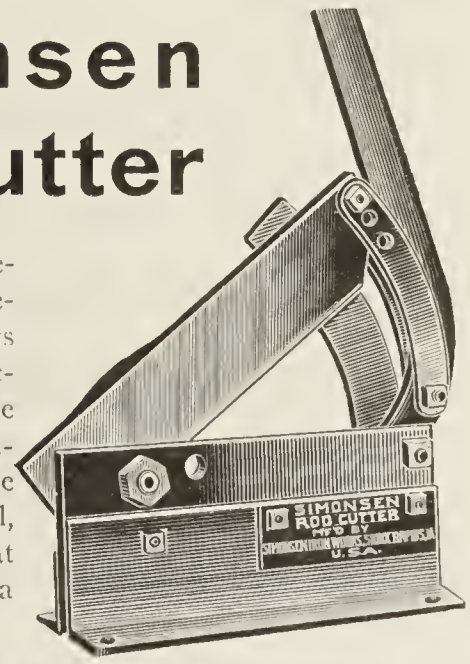

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MATERIAL HANDLING MACHINERY

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with which Gravel & Stone Magazine is Incorporated

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(PUBLISHED MONTHLY)

William Seafert, *Publisher and Editor*

J. F. Waldron, *Advertising Manager*

R. M. McCully, *Business Manager*

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Advertising Rates Sent on Application

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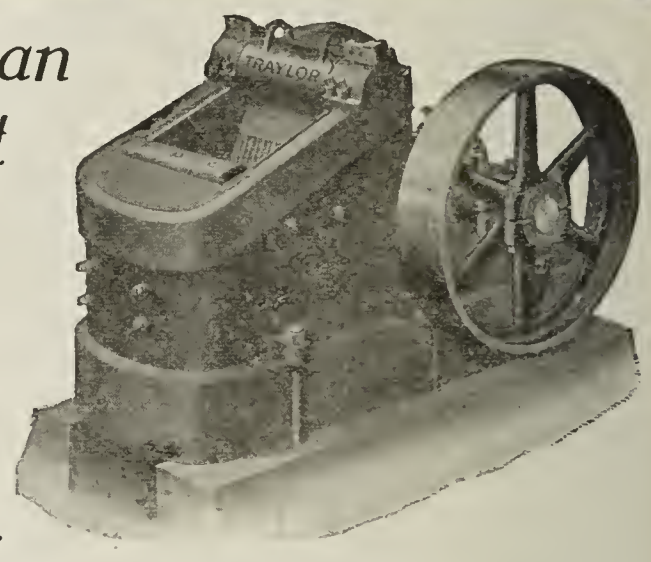
Traylor "Bulldog" Jaw Crushers Mean a Saving at Any Crushed Stone Plant



One method of designing crushers is to make them so massive throughout that it is practically impossible for them to be subjected to strain. Yes, they crush but the cost of operation is terrific.

Traylor Engineers strove to design the lightest yet the strongest crusher possible, that's why the frame of every "Bulldog" Jaw Crusher has a steel band shrunk on it top and bottom and all are equipped with the "Bulldog" Toggle system, the pitman of which is by far the lightest yet strongest of its kind being; made of wrought-steel tension members.

And it's this fine balance of weight and strength that makes the "Bulldog" crusher so economical to the user. Ask your neighbors about the power costs of their "Bulldog" Crushers.

TRAYLOR ENGINEERING & MFG. COMPANY, Allentown, Pa.

New York Chicago Pittsburgh Los Angeles Spokane

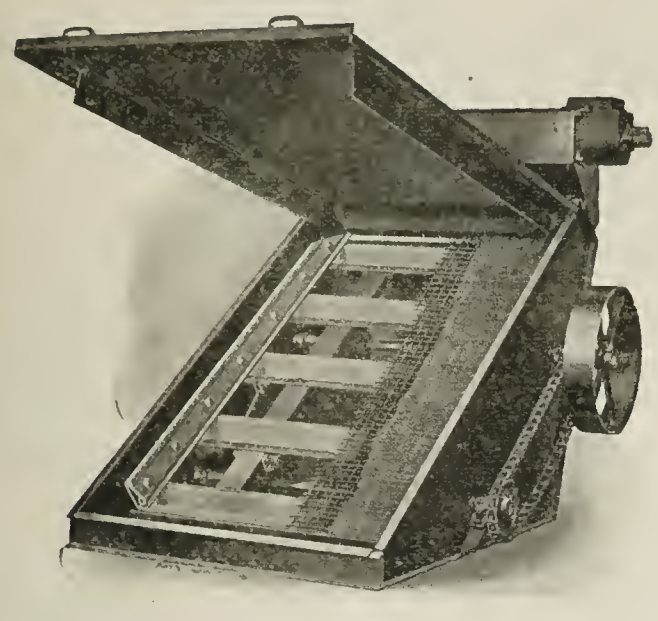
Truck and Tractor Division, Cornwells, Bucks Co,. Pa.

For Immediate Delivery

10 in. x 20 in. Type "A" Jaw Crusher
14 in. "Bulldog" Gyratory Crusher
No. 7½ Gyratory Crusher
36 in. x 16 in. Type "A" Crushing Roll

And the Same Economy That's Found in Traylor "Bulldog" Crushers is Built in Traylor Motor Trucks and All Purpose Tractors

STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY



"BUCKING BRONCHO" SEPARATOR

A plant that tries to screen without a "Bucking Broncho" has yet to know true screen efficiency.

A simple, durable, inclined screen, built upon principles never before attempted, and which has proved a remarkable success. It not only has all the vibratory motion of other screens, but also has many others, not heretofore utilized. It not only has the ordinary up and down motion, but has a further to and fro and lateral motion, as well as a rotating motion, together with many slaps, jars and shakes. This tremendous amount of vibration, not only screens the material far better than any former device, but also considerably augments its capacity per square foot of screening surface.

Its screening surface is not stretched, yet it cannot sag even if one stands upon it, because it is held up by the coarse foundation wires, resting on the saddle.

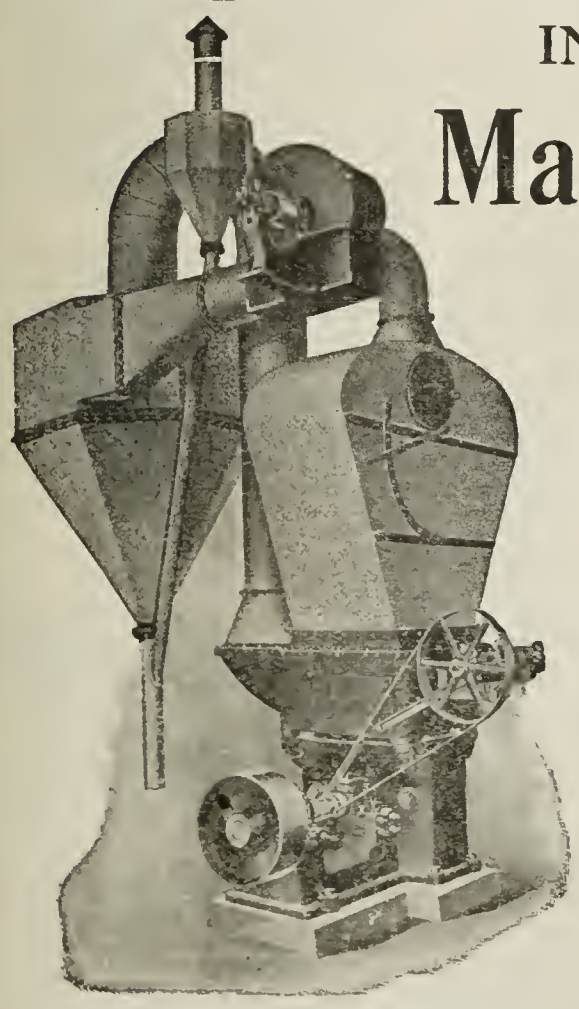
CRUSHERS—GRANULATORS — GRINDERS—PULVERIZERS — SCREENS—MIXERS—ELEVATORS — CONVEYORS — CHUTES

STURTEVANT MILL CO., BOSTON MASS.

HARRISON SQUARE

NEW YORK, SINGER BLDG. CHICAGO, PEOPLES GAS BLDG. PITTSBURGH, 1ST NATL. BANK BLDG. ATLANTA, HEALEY BLDG.

Complete Grinding IN ONE Machine



In successful use grinding Cement, Clinker, Limestone, Coal

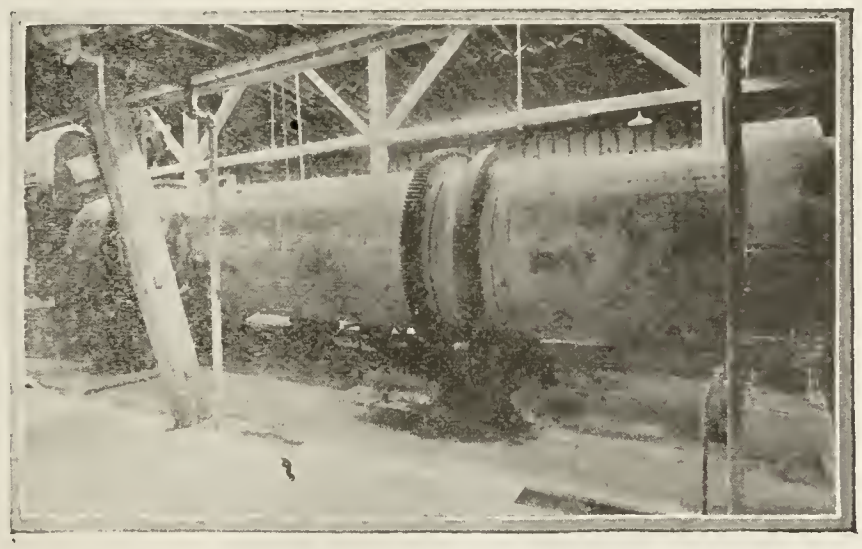
INSTANT REGULATION OF FINENESS

NO DUST

Send for Circular

THE BONNOT CO.

CANTON, OHIO



Better Drying—Lower Costs With Ruggles-Coles Dryers

EACH of our eight standard types is intended for a definite purpose and sold for that purpose only. Operators of Ruggles-Coles Dryers are therefore assured of rapid, uniform and satisfactory drying—without the slightest sacrifice in quality of the material dried. Where a carefully designed and built dryer of the Ruggles-Coles type is used, the owner naturally and continuously enjoys decided economies in fuel and labor, as well as benefits by faster and better drying.

Attention is called to the unretouched view of our Class "B-10" Dryer. Note the strong and simple construction.

Ruggles-Coles Engineering Company

120 Broadway, New York City

The Bradley Hercules Mill

Built for the Preliminary Pulverizing of Cement Materials

In Operation at the Largest and Most Successful Cement Plants Since 1913 —More Popular Than Ever and More Successful

13 Mills Sold to Pennsylvania Manufacturers
Other Installations in Tennessee—New York—North Carolina—
Illinois—Oklahoma—California—Washington—Cuba—Argentine

It's the largest preliminary machine manufactured adapted for pulverizing Cement Rock, Limestone or Clinker.

One manufacturer with two mills ground 170,000 barrels Clinker in one month—another manufacturer has averaged 40 tons per hour, when grinding Limestone over a period of several years of operation.

It's a Wonderful Labor and Power Saver

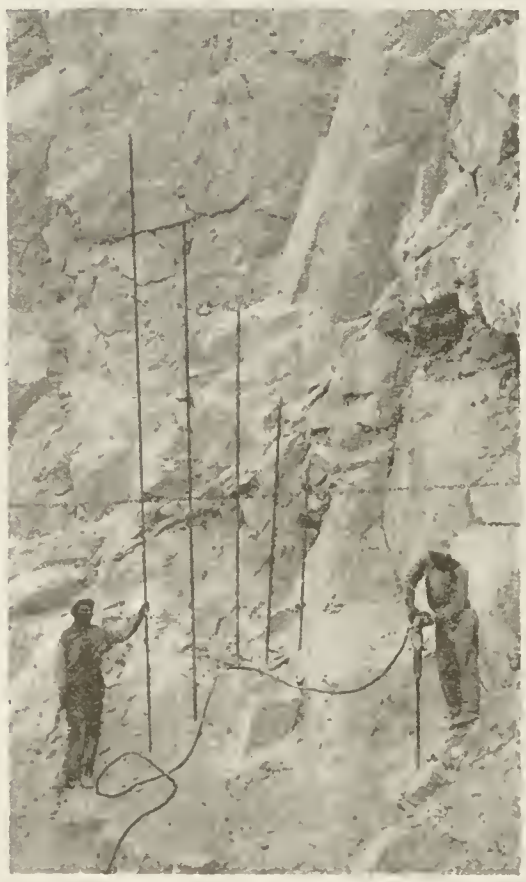
Our Engineers will gladly show you how this mill will reduce your present operating costs, using your present tube mill equipment, and increase your output.

BRADLEY PULVERIZER COMPANY

Works: Allentown, Pa. **BOSTON, MASS.**

Manufacturers of Pulverizing Machinery for 30 Years

Cement Quarry Drilling with Rotators



Saves time and labor at the "glory-hole" quarries of the Pacific Portland Cement Co., near Auburn, Calif. Holes 20 to 30 ft. deep are drilled quickly and at low power cost by these one man, 40-lb. tools. Sullivan Hammer drills have been standard at this operation since 1913.

A Sullivan Air Compressor and Drill Sharpener are also used.

Ask for Rotator Bulletin No. 1770J

SULLIVAN MACHINERY COMPANY
418 PEOPLE'S GAS BLDG. CHICAGO, ILLINOIS U.S.A.

DOMESTIC SALES OFFICES
Birmingham Boston Butte Claremont N. H. Cleveland Dallas Denver Duluth El Paso Huntington W. Va. Joplin Juneau Knoxville New York Pittsburgh St. Louis Salt Lake San Francisco Spokane

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Algiers Brussels Calcutta Christiania Durban, Natal Havana Lima London, Madrid Mexico City Paris San Juan, Santiago Shanghai Sydney, N. S. W. Tokyo Treorchy Tunis, Turin, Vancouver

SULLIVAN PRODUCTS
Air Compressors Air Lift Pumps, Diamond Drills, All-Hammer Drill Sharpeners, Drill Steel Furnaces, Forge Hammers, Ironclad Coal Cutters, Rock and Hammer Drills; Quarrying Machinery, Contractors for Diamond Core Drilling

THE OSGOOD STEAM SHOVEL

is designed throughout for the heaviest kind of service. It meets demands where maximum strength is required and severe work to be done, such as found in cement and crushed stone quarries.

It has all the features in good steam shovel construction which embody steel gears with machine cut teeth; manganese racks and pinions for dipper handle; cast steel swinging circle; heavy front end construction; especially strong boom; large boiler and water tanks; long car frame; enclosed firing platform; steam hoisting friction; by-pass throttle, etc.

We will take pleasure in furnishing you on request complete information on any of the different size shovels we build, which range from ¾ to 6 cubic yard capacity

Write today for copy of our New General Catalog

THE OSGOOD CO.,
Marion, Ohio

Austin Gyratory Crusher

Here is a crusher which possesses, in addition to every standard feature of construction, six big exclusive points of advantage.

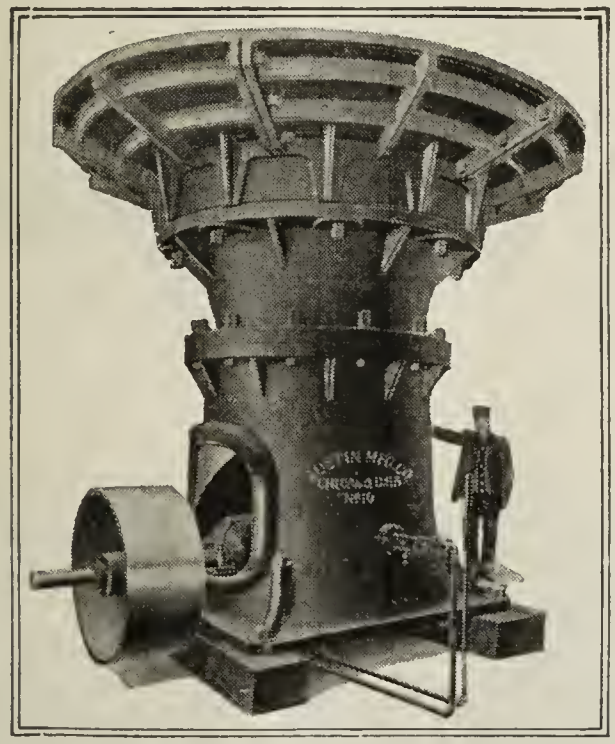
It is the only crusher with these points. Mark them well:

1. Automatic oiling system.
2. Rigid eccentric bearing in main frame.
3. Size of rock receiving aperture constant—even after adjustments for wear.
4. Counter-shaft supported on each side of driving pinion.
5. Full eccentric bearing surface retained, even when head is raised.
6. Working parts thoroughly protected from dust and dirt.

These features explain the success stone producers have with Austin Equipment.

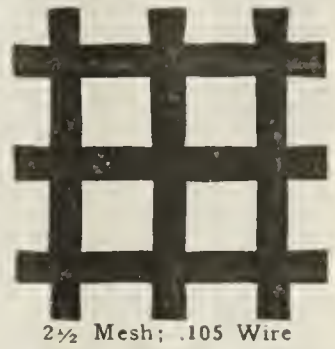
Austin Gyratory Crushers are made in eight sizes with an hourly capacity of from five to five hundred tons.

Catalog No. 28 giving full particulars of this and other crushing apparatus, bins, screens, elevators, etc., on request.

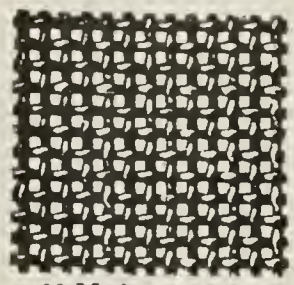


Austin Manufacturing Company
New York CHICAGO San Francisco
Canadian Agents: Mussens Limited, Montreal, Toronto, Winnipeg, Vancouver.

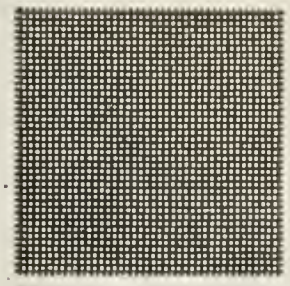
Cleveland Double Crimped WIRE CLOTH



2½ Mesh; .105 Wire



12 Mesh; .047 Wire



40 Mesh. .0135 Wire

You should use our screens because a uniform fineness of screened product is assured by an even, accurate mesh. This is a characteristic of "Cleveland" Double Crimped Wire Cloth.
Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

The Cleveland Wire Cloth & Mfg. Co.
3579 E. 78th Street, CLEVELAND, OHIO

SWABY

Gravel and Dredging Pumps

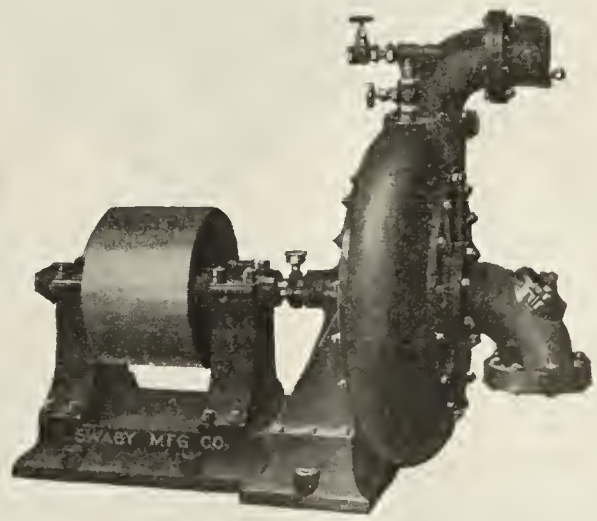


Illustration shows belted outfit but can also be supplied direct connected to Vertical Engine upon same base.

Swaby Manufacturing Co.
2010 MARSHALL BLVD.
CHICAGO, ILL.

"WE ARE GLAD"

TO RECOMMEND

GRUENDLER

AUTOMATIC PULVERIZER

"Because it has proven beyond doubt its Reliability, Speed Power and Dependability.

"These are the reasons why we gladly recommend the Gruendler crusher and pulverizer, which we have been operating in our plant for the past four years. Its repair costs are unusually low, it requires very little power and it turns out a clear uniform product with great rapidity. We are well pleased with our Gruendler pulverizer."

(Signed) W. D. GEARHART, Mgr. Illinois Limestone Co.,
Robinson, Ill.

EQUIP YOUR CRUSHED STONE PLANT WITH A

GRUENDLER

AUTOMATIC PULVERIZER

It will increase your output, lower your costs and deliver a more uniform material.

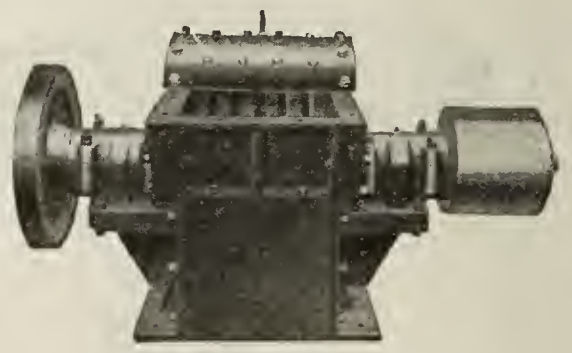
A powerful mill, built for long service and uses less horsepower, giving greater capacity due to our improved features, Ball-Bearings and Sledge Hammer Principal. Our price is right.

"35 years of square dealing our guarantee." Built in standard sizes, 3 tons to 3,000 tons daily.

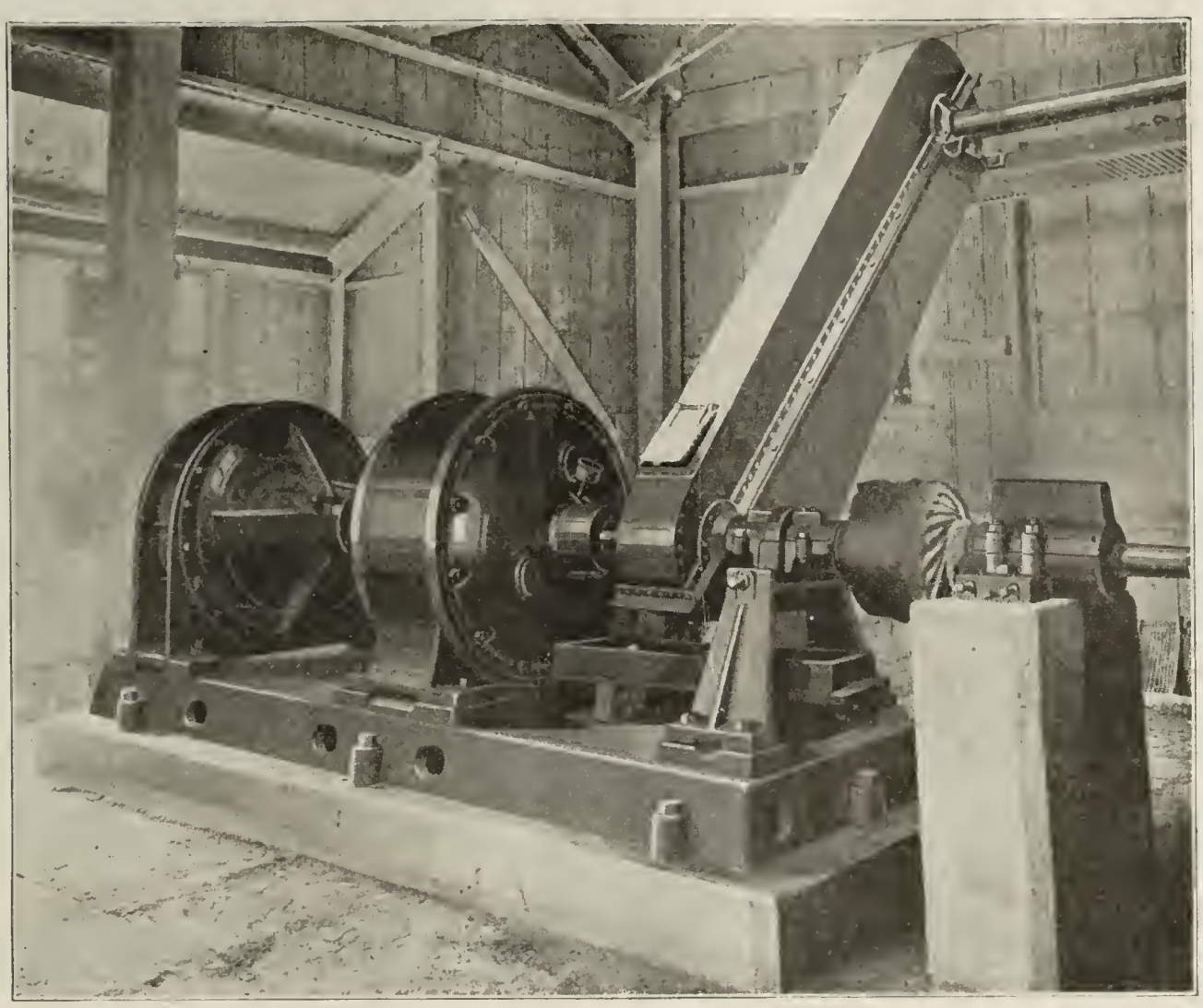
Literature describing each model in detail ready for you. Send today.

GRUENDLER PATENT CRUSHER & PULVERIZER CO.

904 No. Main St.
ST. LOUIS, MO.



PLANT OF THE ILLINOIS LIMESTONE CO.



Saving Upkeep—with the Jones Speed Reducer

A typical installation of the Jones Spur Gear Speed Reducer is shown above—in operation at a plant of the Western States Portland Cement Company.

By curtailing maintenance cost, the Jones Speed Reducer is a permanent money-saver in industrial plants throughout the country. Scarcely any attention is ever necessary after installation. Lubrication is automatic and unfailing. The semi-steel housing completely protects the mechanism from dust, and prevents it from catching in workmen's clothes.

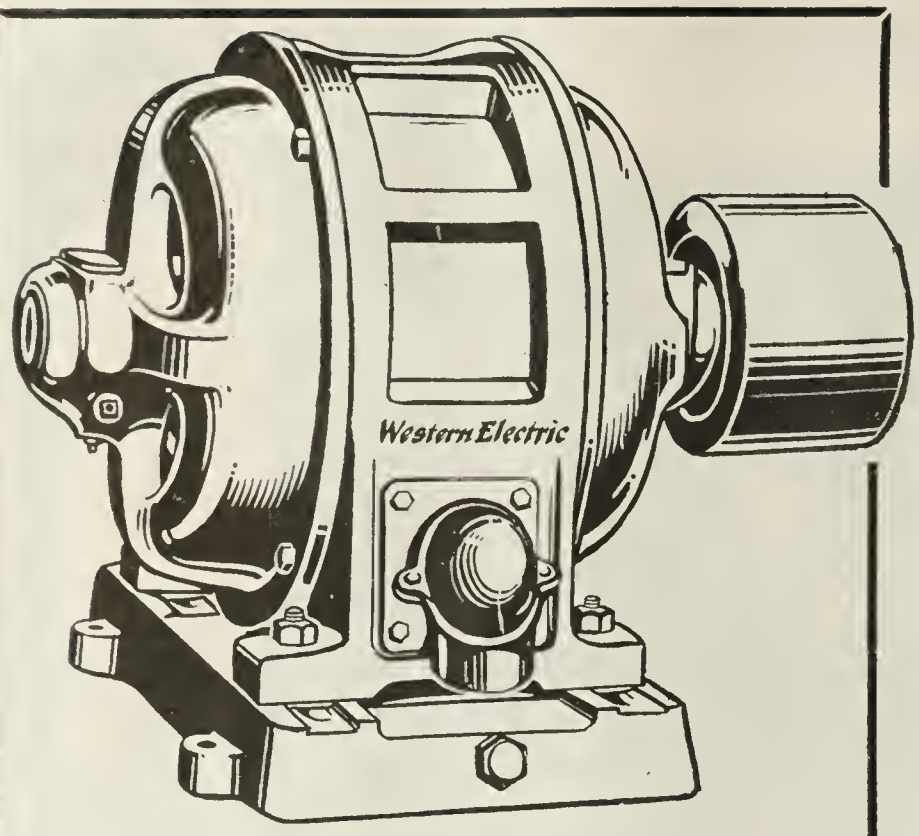
W. A. Jones Foundry & Machine Co.

4406 West Roosevelt Rd., Chicago 20 Murray St., New York

Manufacturers of Cast Iron Pulleys, Gears of All Kinds, Couplings, Lemley Friction Clutches, Pillow Blocks, Hangers, Speed Reducers and General Power Transmission Machinery

J-118

JONES



DID YOU EVER STOP TO CONSIDER

That we have spent years of our time on your electrical problems? Years of untiring efforts which embraced university training, laboratory tests on material, plant analysis, etc? We offer you today the services of men from our organization who can carry your problems through to a successful issue, can meet your emergency just the same as we met others.

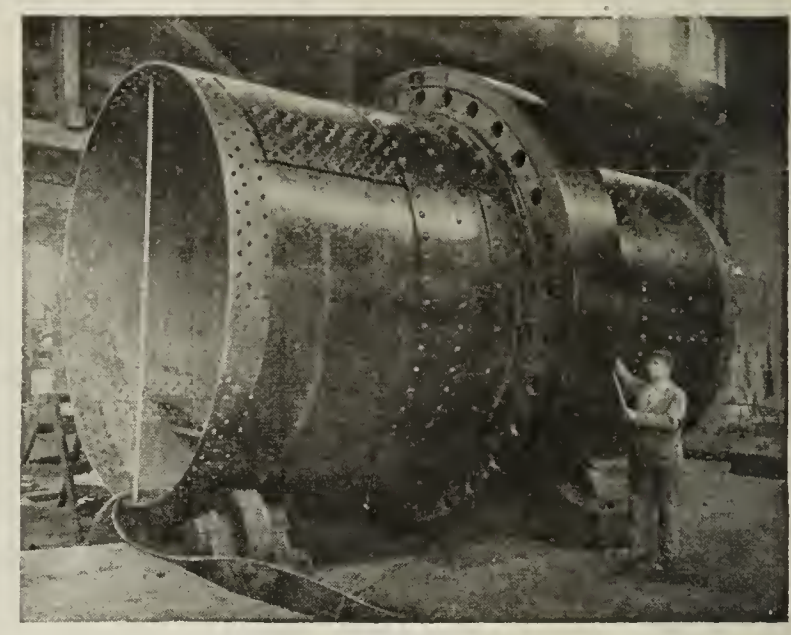
We are specialists in Motor Designing, Motor Building, Coil Building and Power Surveys. The knowledge we have gleaned after making a thorough study of cement mill plants and their operation, the experience we have gained through making the cement industry our choice of operations and our factory facilities we offer you now. We know we can be of aid to you and we also know you have your electrical problems to solve.

An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States.

Lansing Electric Engineering Co.

All the Name Implies

Lansing, Michigan



STRONG
in Every Detail

VULCAN Kilns are built with due regard to distribution of weight and to take care of overload. The roller bearings and driving gear are constructed to protect them from the unfavorable conditions under which they operate. The tire construction is original with Vulcan and has given excellent results.

It has been said of VULCAN KILNS:

"They are strong at the points that are usually weak in other kilns."

This is true because the detail of construction is not forgotten after the best design has been established.

VULCAN
IRON WORKS

Established 1849

1740 Main Street

Wilkes-Barre, Pa.

BATES
VALVE BAGS

INSURE SAFE DELIVERY

If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

THE VALVE BAG CO. OF AMERICA

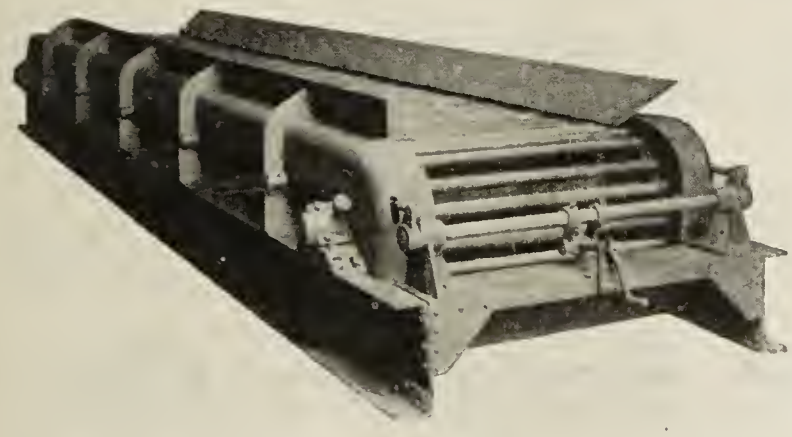
TOLEDO, OHIO

CHALMERS & WILLIAMS

ANNOUNCE

Beginning Jan. 1st, 1921, arrangements for the manufacture and sale of the

ROSS AUTOMATIC DROP BAR GRIZZLEY-FEEDER AND SCREEN



For use in mining, smelting, sand, gravel, crushed stone, coke, blast furnace and numerous other plants.

Cannot block or choke—will handle material at an even rate for 24 hours a day without labor or attendance.

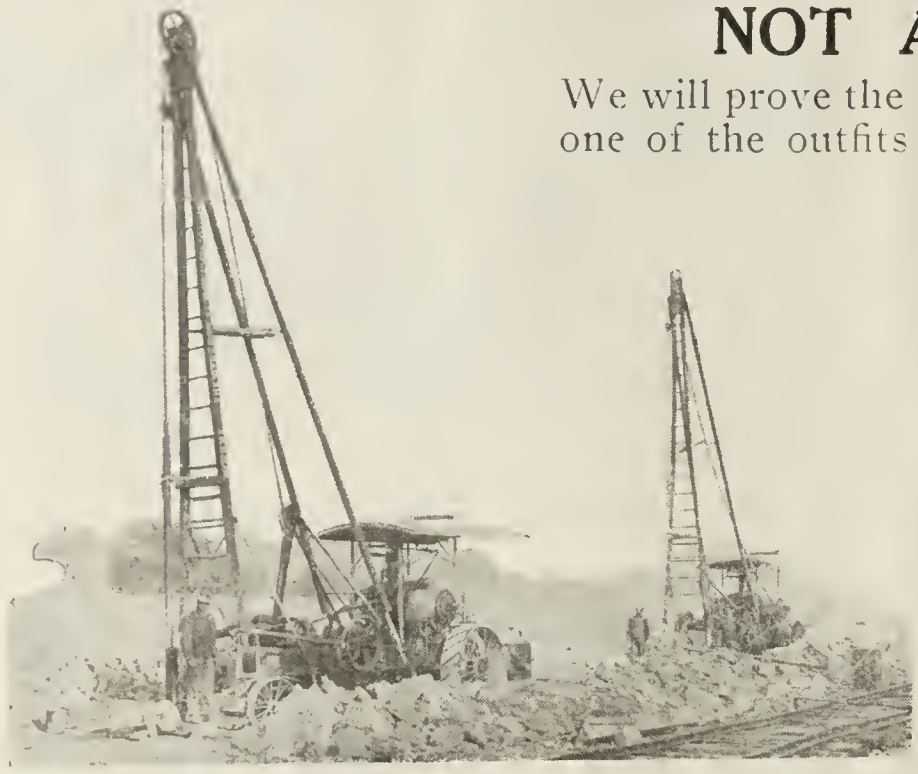
Write for information to

CHALMERS & WILLIAMS

1445 Arnold Street CHICAGO HEIGHTS, ILLINOIS

THE BEST BLAST-HOLE DRILL ON EARTH

THE CYCLONE No. 14



NOT A BOAST—A FACT

We will prove the superiority of the No. 14 Drill by placing one of the outfits on your work against any or all other makes.

If the Cyclone doesn't out-drill and out-wear all other drills, we will remove it from the work without cost to you.

Our proposition gets below the paint. It demonstrates what the machine will do—not what may be said about it. It puts buying on a strictly engineering basis where it belongs.

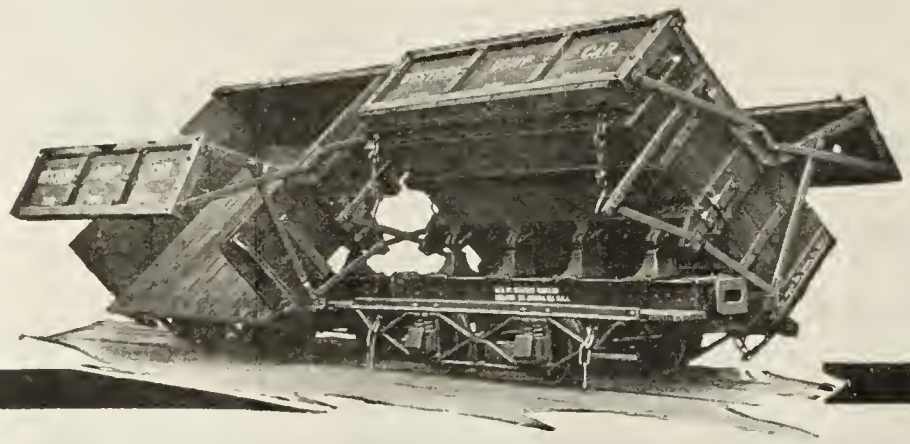
Furnished in Steam, Gasoline, Compressed Air or Electric Power, Traction or Non-Traction.

Let us send you full particulars

THE SANDERSON CYCLONE DRILL CO.

ORRVILLE, OHIO

Eastern and Export Office
30 Church St., New York



WESTERN CARS GIVE DEPENDABLE SERVICE

An idle crusher earns no money; an idle shovel eats up profits —the limiting factor is your haulage equipment.

Your dump cars must stand up under hard work; repairs and delays will increase your production costs; they must dump easily and get back under the shovel quickly, or they will lessen your output.

Western Dump Cars are built to last. They outwork and outlive other makes of dump cars; they will dump more easily and dump clean. They are used extensively in plants similar to yours, where you can find out their worth. Let us refer you to some nearby plant which has installed "Westerns." All practical sizes, 1 cu. yd. to 45 cu. yd. capacity. Write today.

Western Wheeled Scraper Co.

AURORA, ILL.

Western Western

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

3,000 BBL. WET PROCESS CEMENT PLANT FOR BESSEMER LIMESTONE & CEMENT CO., BESSEMER, PA.

UNDIVIDED RESPONSIBILITY

ALLIS-CHALMERS A-C MILWAUKEE

PARTIAL LIST OF EQUIPMENT FOR BESSEMER LIMESTONE & CEMENT CO.

3—10′x175′ KILNS WITH 8′x60′ EXTENSION.
3—8′x60′ COOLERS
6—726 COMPEB MILLS
1—622 COMPEB MILLS
1—6′x60′ COAL DRYER
6—500 H.P. SYN. MOTORS
1—300 H.P. SYN. MOTORS
COMPLETE NO. 24 CRUSHING PLANT

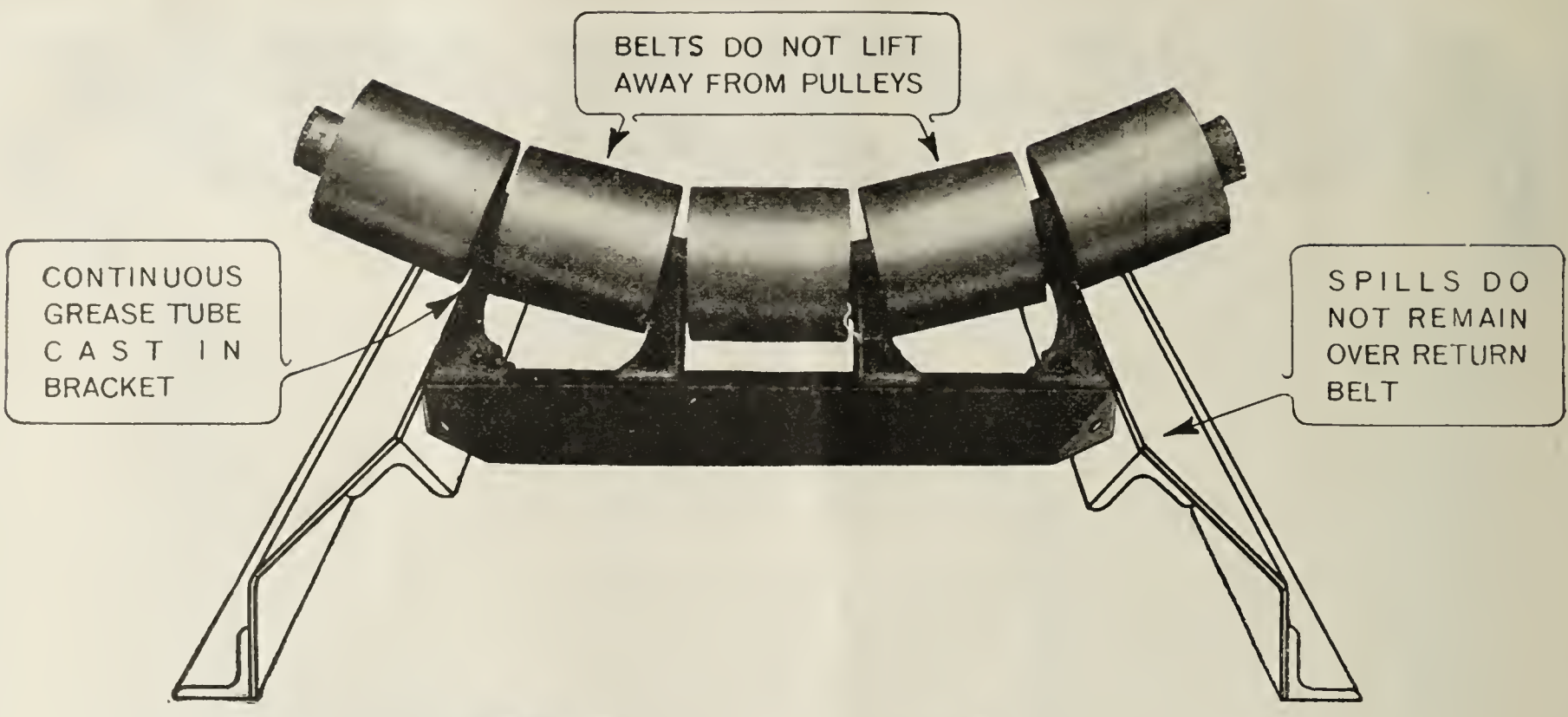
ANOTHER COMPLETE INSTALLATION

WE ARE PREPARED TO CONTRACT FOR EQUIPMENT AND ENGINEERING FOR A COMPLETE CEMENT PLANT.

YOUR REQUIREMENTS CAN BE EFFICIENTLY SERVED BY THE ALLIS-CHALMERS ORGANIZATION.

ALLIS-CHALMERS MANUFACTURING CO.

MILWAUKEE, WIS., U. S. A.



The little things that count

The outstanding features in conveyor rolls are not always the ones that make any one type the most desirable. They are usually too obvious to require comment.

It is to many minor points, whose value is often underestimated, that Dodge Conveyor Rolls owe much of their supremacy.

Above are illustrated some of the features; their practicability appeals to the operator.

DODGE

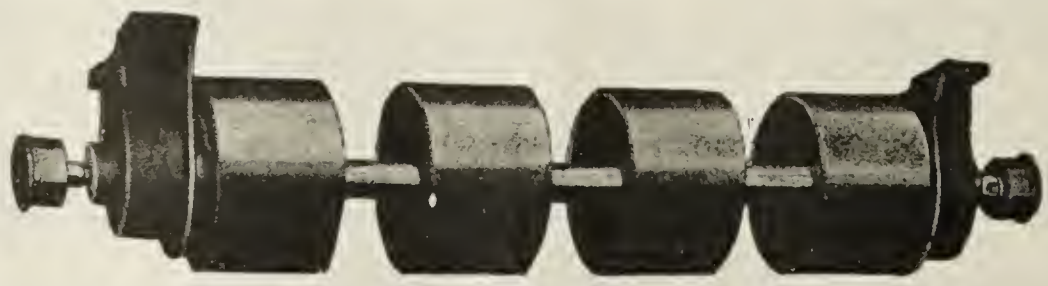
Dodge Sales & Engineering Company

Distributors of the products of the Dodge Manufacturing Company and the Dodge Steel Pulley Corporation

General Offices: Mishawaka, Indiana Works: Mishawaka, Indiana, and Oneida, New York

Canadian Plant: Dodge Mfg. Co. of Canada, Ltd., Toronto and Montreal

Philadelphia Cincinnati New York Chicago St. Louis Atlanta Boston
Pittsburgh Minneapolis Houston Seattle Newark



Cement and Engineering News

Vol. 33 Chicago, May, 1921 No. 5

"Do It With All Thy Might"

Build that house now; construct that highway at once; build that school, that church; repair that broken pavement; build that garage, and even that chicken-coop, now—not tomorrow.

Go ahead with your plans; speed the nation on the road to full employment, and thus hasten the day of individual and national prosperity and safety.

Preach this from the pulpit, ye ministers of the Gospel; act it from the pews, ye laymen who profess a love for humanity; put it into effect, ye county, municipal and state officials, and remember, ye business men of America, ye men of "big business" and ye men of "little business," that there is something in this infinitely higher and more important than the small amount of money involved which you think you could save by waiting.

Some men put off the day of salvation, expecting to attend to it on their death bed, but not many ever succeed in doing it at that hour. "Do it now, and do it with all your might," should be the motto of every man in America who expects to do any construction work in the near future. "Do it now," and thus do your part toward individual and national business salvation—and even more.

Procrastination is more than the thief of time; it is the murderer of opportunity.

The Reward of the Stayer

Did you ever realize that all the big life insurance companies are monuments to the lack of staying quality in men?

Their greatest source of revenue is from lapses.

That's why they can afford to pay such big dividends to the men who stay through to the end.

Successful advertisers—successful business men—are always stayers.

To make a success of advertising, one must stick to it like a barnacle to a boat's bottom.

Advertising doesn't jerk—it pulls—a steady pull.

Every ad goes to confirm the one before it—to strengthen the one that is to follow and there's no waste of effort or money.

The stayer wins every time.

Concrete Bricks

Wilson Concrete Products Corp., Carl F. Stevenson, secretary-treasurer, Lockport, N. Y., who operate Besser machines, writes: "We are meeting with wonderful success with our concrete brick sales this year and believe that before the summer is over we shall have to double the capacity of our plant.

A matter which might interest your readers is that we have been a party to a committee basing an appeal to the Interstate Commerce Commission to interchange of freight at Lockport. We have been successful in having this granted and this means that we have an additional 100 square miles of territory opened up to us at a low freight rate. The Interstate Commerce Commission have not as yet given us a real decision on whether to allow us to ship concrete brick at the same rate they ship clay brick or not but we are right after the matter and expect that it will be granted us in a month or so.

New Block Factory in Akron

The Dethloff Cement Products Co., A. G. Freudeman, secretary, 169 Park Place, Akron, Ohio, a new organization, have just completed a new plant and they write us as follows: "Our factory has a daily capacity of 1,000 blocks. We have on our property, which is located immediately adjoining the B. & O. railroad main tracks, a number one grade sand to work with and later on we expect to put in six car siding for gravel and sand shipments.

"We are handicapped with cut-throat method of competition in this territory and in correspondence with men in the same field of manufacturing in Detroit, Buffalo and Cleveland. I am informed that standard of price is 10 and 15 per cent higher than here. Trouble is we are compelled to compete with inferior block and some rediculous prices. We should like to know if any movement has been started towards an association of industries in this line and if so, with whom shall I communicate to the end that something of this nature is started here to raise the standard of quality and maintain standard of price which, if allowed to continue, will eventually discourage the use of blocks in this territory just when we are trying hard to introduce cement brick in construction work.

Important Consolidation

After the annual meeting of stockholders of the Crescent Refractories Co., Curwensville, Pa., it was announced that the George S. Good Fire Brick Co. and the Clearfield Clayworking Co. had been consolidated with the company's properties. This merger unites three important fire-clay and coal holding concerns in Clearfield county. The output of the plans now operated amounts to 240.000 bricks a day and marks another forward step in the industry. It is also important to note that James B. Graham, president of the Northern Central Trust Co. of Williamsport, Pa., has been elected president of the board of managers of the Crescent Refractories Co.

After the Blast—What?

The shot has been fired. As the smoke clears away, a splendid sight is presented to view—a scattered mass of well-broken rock, and rising out of it a clean quarry face. The blast is a success. The quarry superintendent of the cement plant and his men view the results with a sense of satisfaction. The dynamite, efficiently loaded did its work.

But, isn't there an annoying feature connected with the operation? There is.

For years, the satisfaction accompanying a successful blast has been marred by a peculiar condition affecting the comfort and disposition of the men handling the explosives and conducting the blast. This condition is known to all blasters as the "powder headache," which is experienced by the men from the contact with the dynamite cartridges and the fumes evolved on detonation. The headache is of the throbbing, nauseous variety, whose only cure is time. The effects must wear off. You cannot chase them away.

The recent announcement of a new explosive, the use of which will not cause headaches, has created a sensation among quarrymen. Many cement quarries have adopted its use and the reports regarding the results obtained are very interesting. Blasters have handled and loaded cartridges without gloves and have not experienced the slightest headache. They have not noticed any objectionable fumes and have found that fewer cartridges of this powder are required to accomplish a successful blast than was needed with the use of ordinary dynamite. The trade name of the explosive is "Atlas Non-Freezing," so called by its manufacturers because of the fact that it is especially suited for cold weather blasting. It cannot be affected by any degree of cold. Thawing is never required.

The formula followed in the making of Atlas Non-Freezing, the non-headache powder, is an entirely new discovery. Through the use of the explosive, quarrymen may now view the effective results of their blast with double satisfaction.

Storage of Sacked Cement

A booklet recently published by the Portland Cement Association, Conway building, Chicago, describing the best methods of storing and handling sacked cement. If cement is properly stored it may be kept for several months without depreciating in quality. The purpose of this booklet is to show how this can be done. Suggested plans for storage buildings of wood and concrete are given, together with materials required for these buildings.

Sauerman Brothers Standardize Power Scraper Installations

Sauerman Brothers, engineers and manufacturers, 1139 Monadnock building, Chicago, have perfected several different types of installations for their bottomless power scrapers, and standardized them for use in sand and gravel pits, stripping, and general excavating work.

They have had exceptionally good results during the past year, and have found that best service and maximum efficiency are obtained when the proper double-drum hoisting engine, blocks, sheaves, wire rope and anchorage are assembled in a complete installation to fit certain peculiar conditions and requirements.

Sauerman standardized installations are in use by a large number of commercial sand and gravel producers who have had remarkable success with them.

The company has recently issued a new pamphlet, No. 12, which will be sent to interested parties on request.

For Cutting Reinforcing Bars on the Job

The bar cutter made by the Simonsen Iron Works, Sioux Rapids, Ia., is made entirely of wrought steel and designed especially to meet the requirements of bridge builders, pavers and other builders of concrete construction needing a portable shear for cutting reinforcing bars out on the job.

The cutting jaws are of the "welded in type" our own patented design. Main body of jaw is mild steel and has a high grade tool steel facing welded in by a special process effecting a combination of steels forming a reinforcement to one another. This combination provides a jaw of the greatest toughness to which we can give a temper that will stand more abuse than the ordinary type of shear blade.

Lower or stationary jaw is provided with a hole to receive and hold bar while being cut. This hole having a keen edge of hardened tool steel is practically indestructible.

Upper jaw is the one doing the actual cutting and is hinged at rear end on a heavy case hardened steel pin. The reinforced construction of this jaw gives it an edge that will stand a great deal of cutting without losing its keen edge.

The lower jaw should never need any attention. The upper jaw can be readily resharpened by any one, should this become necessary. Simply remove and touch up on emery wheel or grindstone. This feature alone will avoid delays often caused by waiting for new blades where the ordinary type of inserts are used.

Made in three sizes. No. 10, weight about 75 pounds. Capacity ¾-inch round or ½-inch square twisted.

No. 11, weight about 125 pounds. Capacity 1-inch round or ¾-inch square twisted.

No. 12, weight about 175 pounds. Capacity 1¼-inch round or 1-inch square twisted.

These cutters are shipped all set up complete with suitable lever ready to bolt to plank or other base, and having no castings whatever are nonbreakable. A very practical low priced shear that will pay for itself in a short time.

Bradley Pulverizer Co., Allentown, Pa., has just shipped to the American Agricultural Chemical Co., Henderson, N. C., two Bradley 3-roll mills, to be used for reducing phosphate rock. With the resumption of activities in the cement business this company expects to close several large orders for pulverizers and is of the firm belief that eventually all tube mill finishing cement plants will use the Bradley-Hercules mill as preliminary pulverizer. There is no question but that the cement industry will be the first to return to a normal basis. Mills manufactured by this concern now pulverize approximately 60 per cent of the cement materials of the United States.

Nebraska Cement Company Builds Reinforced Double Walls Concrete Houses with a Dead Air Space

Double wall concrete houses with a dead air space have been built economically by the Nebraska Cement Company of Superior, Neb., using Frost's wall forms made by the Hollow Concrete Wall Co., Mitchell, S. D. The accompanying illustration shows the construction of sixty houses and a three-story hotel for their employees.

After a thorough investigation of different hollow wall systems the Nebraska Cement Company decided on using the forms made by the Frost Hollow Concrete Wall Company. The picture shown herewith gives you an idea what they have done in less than four months with one set of forms. Mr. W. T. Groner, superintendent, Nebraska Cement Co., writes as follows:

"Regarding operation of forms, will say that we are well satisfied and do not believe there is anything on the market that could equal same for our requirements. They fulfill every claim you make for them regarding simplicity and economy of operation."

The Hollow Concrete Wall Company's headquarters are at Mitchell, S. D., they have built houses in Lincoln, Plainview and Opportunity, Neb. Also at different parts of South Dakota as well as at their home in Mitchell where they have built a number of houses in different parts of the city and are now finishing the last of a group of eight dwellings in Capital Addition to Mitchell.

The Henningson Engineering Company have arranged for the use of the Frost system for building twenty-five residences at Hastings, Neb., and thirty houses at Council Bluffs, Iowa, as well as the exclusive use in their own city, Omaha, Neb.

The Hollow Concrete Wall Company had more business than they could take care of in 1920, but they enlarged their facilities for manufacturing and have increased their capital, so as to take care of their expanding business.

They have arranged with H. W. Remington, 59 Front St., New York, N. Y., to act as distributing agent for the New England states and foreign countries, also a brother of the patentee O. J. Frost, 760 N. Rowen Ave., Los Angeles, Calif., is now making arrangements to take care of the western Pacific territory.

New Hollow Building Tile

The Besser line of equipment, sold by the Besser Sales Co., 1302 21st Street, Alpena, Mich., now includes machinery to produce, in addition to hollow building tile designed to be laid in the wall with vertical core arrangement, a new tile which will be laid in the wall with walls running horizontally. The tile will be made in heights of either 3, 4, 5, 6, or 8 in. The standard width will be 4 in., and the standard length 12 in. The base unit will be either 3, 4, 5, 6 or 8 in. high, by 4 in. wide, by 12 in. long. The machine will make multiples of these base unit tile up to a maximum length of core bos, 24 in.; thus, two 4x12x12 in. tile can be made at a time, or six 4x4x12 tile, or four 4x6x12 tile.

The tile will be made on a single pallet or on a special self-racking pallet, permitting tile to be piled to any height.

News Items of Interest

Superior Portland Cement Co., Concrete, Wash., have installed a 42-inch Traylor gyratory in the quarry and expect to materially reduce operating cost through the use of this gyratory. This plant has an annual output of 1,000,000 barrels. In addition to the 42-inch Traylor gyratory, the company has one 12-inch Traylor gyratory, one No. 6 Gates crushers and two Sheridan (Traylor) grizzlies. In the raw grinding department they have one Bradley-Hercules, one 7 by 9 foot ball mill, and one 5 foot 6 inches by 22 foot and one 7 by 22 foot tube mills. In the finishing department one Bradley-Hercules and seven 6 by 22 foot tube mills are used.

Purchasing Belts

Belt used in crusher plants are subject to hard usage. Many of them are exposed to the weather while all are subjected to much dirt and dust, especially stone dust. For these reasons belts should be selected with great care and discretion.

Besides the durability of the belt, two points stand out pre-eminently for consideration: these are the stretching and slipping of the belt.

There are many preparations used on belts to prevent them from slipping, and although many of these have merit and are a great help in operation yet a belt which gives the minimum of slipping under normal conditions is vastly superior to one that can only be prevented from slipping by applying some preparation to the surface.

Stretching, like slipping, means a waste of power and a decided loss in production. It also means time and labor spent to remedy the stretching; but until it is possible to remedy the trouble by taking up the stretch, the loss of power as well as production can readily amount to the cost of the belt in a few days.

It has always been one of the endeavors of manufacturers to make belts that do not stretch or slip. A belt to overcome these faults must be of the proper weight for the service it must render, and it must be exceedingly dense. One that is not dense will not stand changes in the weather from dry to wet and also in temperatures. Density likewise increases the resistance of a belt to wear. Besides being dense a belt must be pliable, must have great tensile strength and a huge co-efficient of friction. This last will prevent slipping.

In purchasing belts for power transmission, these are the factors to keep in mind. In other words, belts should be bought on specifications instead of buying them as one would nails.

Double Speed Block and Brick Machine

Wood Bros. Thresher Co., Des Moines, Ia., who manufacture the "Double-Speed" brick and block machine, declare that this machine makes in each operation: 2 hollow blocks, 2 silo blocks, 2 solid blocks, 2 slabs, 4 half blocks, 2 water table slabs, 2 return ends, 2 chimney blocks, or 2 porch pier blocks. The Double-Speed brick machine makes 16 bricks at each operation, 8 brick being delivered at each side of the machine. The Double-Speed Tamper gives the black machine a capacity of 1,500 blocks per day and speeds the brick machine up to 15,000 brick per day. Roller-cut-off removes surplus material from mold box and finishes the top of the product. The block and brick are tamped rapidly and vigorously, resulting in a dense, strong product. Machine consumes little power and is practically fool-proof.

Examples of Imitation of Building Rock With Stucco

Imitating Building-Rock in Stucco

By HJALMER LINDQUIST

A concrete stucco wall simulating rock, differs from the ordinary stucco wall only in finish and coloring. The work is not difficult nor does it take as much time as appearances seem to indicate.

The expanded metal lath, or netting, is given two coats of stucco mortar, the usual mixture and put on in the usual way. (Half-inch coats of 1 cement to 1½ sand for good work. Lime is not necessary, though some prefer to use it. A neat cement grout, applied with a brush between coats just before adding the next, improves the wall). The work might be finished in the second mortar coat but three coats will do a better job.

The first coat needs scratching to bind it to the other, and the second also, in three-coat work, to bind it to the third, which is to follow. The third and final coat of 1 cement to 2½ sand, with hydrated lime equal to about 1/20th part of the cement used, is plastered over the second coat when that has set. The lime in this final coat makes a mortar that can be better worked in finishing the detail and it also makes a mortar that is easier to stick to the wall when putting it on. The larger amount of sand used gives a sandy effect after the brushing by showing through the plaster.

The rock blocks are marked out in this final coat, while green, and the detail built up on their surface. The wall that is to imitate odd sizes and shaped rubble stone can be scratched out in blocks with the point of a small trowel with no other aid than the eye to guide the lines, but the square and oblong stone rubble, or stones that fit in layers or equal thickness, will require a straight-edge or a stretched line in marking out the horizontal grooves. The short perpendicular joints that divide these layers into parts may be measured by rule, guessed at, or marked off after a board pattern.

Before starting to mark out the blocks, it is well for the workman to study a wall of the kind of stone that he is to imitate, making that serve him as a model. A small photograph of such a wall that can be held in the hand while working is probably even better. The main features of the original are easily caught and the small detail need not be slavishly followed. When a few blocks have been made the photograph can be laid down and referred to only occasionally for suggestions.

The rock detail on the face of the stucco wall is built up with mortar on the blocks, keeping each block separate. A rather flat rock surface such as that of a quarried granite rubble stone, shown in Fig. 4, will require but little mortar to imitate, while other rocks that have a bulge will require more. When this bulge in a rock is to be large it is sometimes necessary to build it up on the block a little at the time, permitting as much mortar as will stick to the surface to stiffen a little before applying more, working on other stones in the meantime, and then returning to the first again and thus keep building up its face until the desired bulge is had. The rock detail is then added, and if a cut stone imitation, the spall effects also are added around its edge line.

Figure 2 is a natural standstone wall of cut stone, scaly without much bulge. The imitation copies the main features of the scaly effect. This was done by sticking thin layers and dabs of mortar to the blocks, letting it set for a while and then finishing the work off better by scraping.

The rubble stone, Fig. 5, was done much the same way. It took less mortar and the scaly layers on the surface were omitted. Short broken lines were made instead by adding little dabs of mortar, smoothing them down on one side to nothing while the other edge, less than ½ in. thick, was left untroweled.

The natural rubble wall, Fig. 4, shows some of this scaly effect, but not so much as the imitation, Fig. 5, lower half. The effect was heightened in an effort to produce something more pleasing to the eye. Assembling effective features for striking effects is the work cut out for the artist, and everything is well if he does not go too far beyond the modesty of nature.

Finishing greatly improves the looks of this rock work. If enough mortar has been stuck to the blocks much of the finer detail can be cut in with the trowel point at this time. The blocks are scraped, when the mortar coat has partly set so as to be in workable condition, about three hours in summer, with the small trowel, to remove all smooth trowel marks left when applying the final coat. The detail is also cut out clean and otherwise sharpened up.

After scraping, the plaster surface is brushed over with a whiskbroom, with a wire brush first if set a little too hard for the broom. The pebbles of sand are thus exposed and threads of sand formed in the rock face by stroking in one direction.

Coloring improves the wall still more. An artificial sandstone wall will want but one color while the granite rubble imitation requires a variety of hues. The four colors, red, brown, yellow, and black, when scattered over such a surface and intermingled by sprinkling water lightly over them, gives a natural effect.

In this matter of coloring there is much room for individual taste, but the color of natural rock should not be departed from too widely lest the work prove fantastic and ridiculous. The best cement colors should be used for this surface method of coloring. The best will not prove expensive because 1 lb. of coloring goes a long way. The colors are made permanent, or nearly so, by adding copperas to them when mixed in water. A little dissolved clay is also added to make the coloring look more natural.

A half pint of copperas solution; that is, copperas crystals dissolved in cold water over night, permitting the water to take up as much of the chemical as it will in that time, is added to each gallon of the colors mixed in separate vessels. A sixth portion of thin liquid clay is about right.

The coloring may be applied to the surface with a syringe or dashed on with a brush. If put on a little thick it can be toned down by sprinkling over gently with water. Weathering the first few months makes the coloring more natural looking. When several colors are used they should intermingle at the meeting places so as not to leave any sharply defined color lines.

The grooves can be jointed with mastic after the work has been colored, left untouched, or colored with some hue that contrasts with the rest of the work.

This kind of stucco might be improved by using aggregates in the final mortar coat, crushed sandstone or granite for instance, for the wall that imitates these stones. This sort of thing has not yet been tried and its worth must be tested by other experimenters.

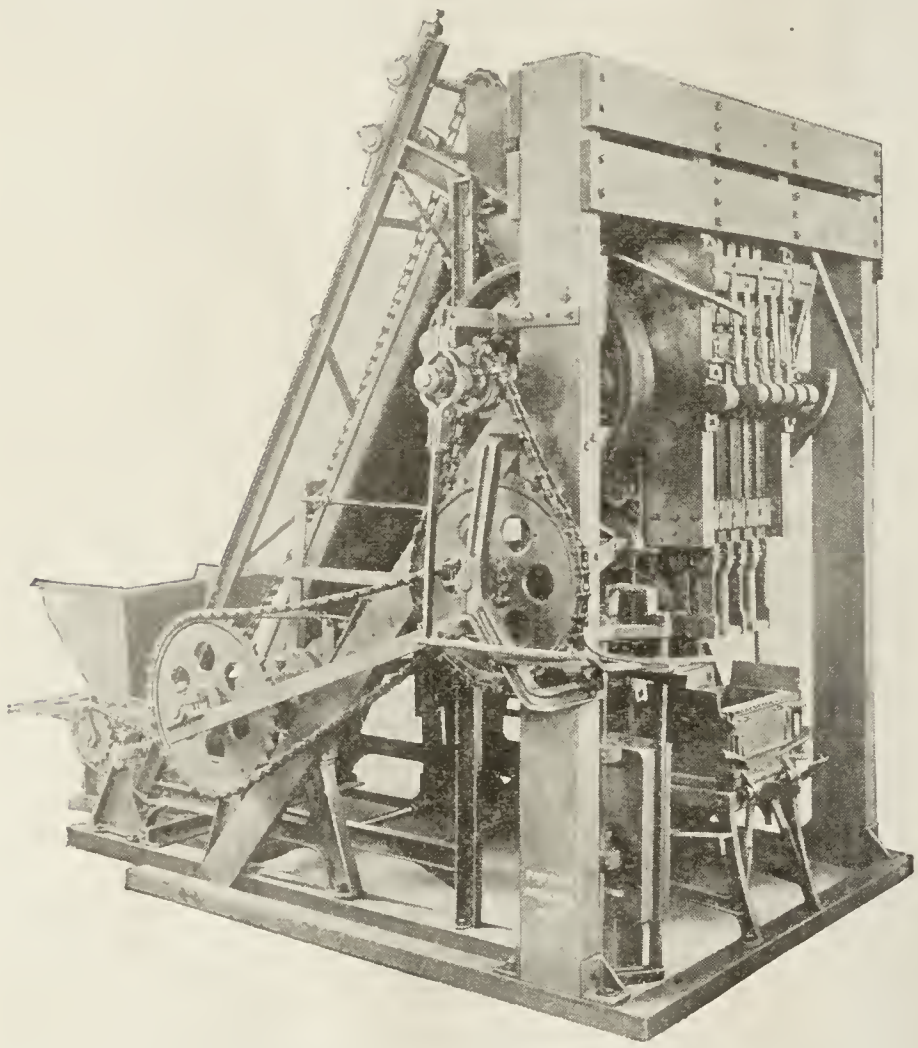
In the illustration (1) indicates odd size rubble stone marked out on the concrete surface and colored without any rock detail or brushing. (Coloring effects do not show in photographs.) (2) A wall of natural sandstone. A slatey kind of sandstone. (3) An imitation of figure two in concrete stucco. Partly jointed. (4) A natural granite rubble. (5) Layer stone and rubble imitated in concrete with groves lines colored black.

New Automatic Block Machine Utilizes Previously Purchased Hand Equipment

When after starting the production of concrete block with hand equipment, the manufacturer finds that the demand for his product is exceeding the capacity of his machine he is often forced to abandon his hand equipment and purchase an entire new outfit.

To eliminate what in most cases would be a loss the Ideal Concrete Machinery Co., 1318 Monmouth Ave., Cincinnati, O., has designed its hand block machine in such a way that power equipment can be added to it, increasing its capacity as the demand warrants.

The Ideal Automatic Block Producing Machine,



Complete Ideal Automatic Block Producing Machine Built Up From an Ideal Hand Machine

which has just been placed on the market, can be built up from an Ideal hand machine. This equipment consists of the Ideal Block Machine, Ideal Power Tamper, Ideal Core Actuator, Ideal Scraper and Finisher, Ideal Conveyor and Feeder and the new Ideal Automatic Cam Attachment. It will be recognized that everything with the exception of the new attachment is old, well-tried Ideal Power Equipment.

However, by means of the old Ideal Equipment it required 23 manual and pedal operations for the production of a block. By means of the new cam attachment, these 23 motions are reduced to one single motion; simply pulling out the starting lever. The machine then automatically feeds in the material and produces a block in 12 seconds, and then stops. Then as the block is removed and another pallet is placed in the machine, the lever is again pulled, producing another block in the same time.

This method of producing an automatic machine has two distinct advantages; In the first place, that of using the well-tried principles of Ideal machinery, which has been successfully manufactured for the last twelve years. In the second place, it is possible for any Ideal customer to obtain a completely automatic block machine without sacrificing any previous equipment that he has purchased. If a man has an Ideal hand block machine only, he can build up from there on. If he has a hand block machine and tamper, he has that much less equipment to purchase for a complete automatic attachment.

Furthermore, the Ideal equipment has always been known for the production of a thoroughly square, true block, and particularly well adapted to face blocks and corner blocks. These advantages of the machine all maintain in the automatic outfit.

Quick Disposal of Trees on Dwelling Sites

By Hannibal Shearin

When a contractor is not justified in using a steam shovel on an excavation job, he likes to adopt the next best method—plows and team scrapers; but trees on the site prevent it. I frequently see contractors clearing building sites of trees in the slowest and most expensive way—chopping down the trees, then grubbing out the stumps.

Recently I showed the Rosemary Manufacturing Company, Rosemary, N. C., a much quicker and cheaper method. There were nine pines, averaging 15 inches in diameter on a plot on which they intended to build. With a helper, I had them off the building site and the ground ready for the plows and scrapers in ten hours and at a cost of $16.00.

I put down bore holes on opposite sides of each tree, loaded a pound of forty per cent ammonia dynamite in each hole, connected up the charges with copper wire and fired with electric blasting caps and a blasting machine.

A rope was tied twenty feet up each tree, with which we pulled the tree down just where we wanted it to fall. There were buildings close by and it was neces sary to control this.

A mistake some contractors make when they use dynamite is in cutting down the tree and blasting the stump; that is, I mean, through the air and may damage contiguous buildings, but it is very seldom that any pieces big enough to do any harm ever are thrown off a standing tree, and the rope makes it possible to lay a tree where it is wanted, whereas the fall of a stump cannot well be controlled.

America's Deficiency in Encouraging Progress in Scientific Art

By C. A. P. Turner, C. E., Minneapolis

(Continued from April issue)

In the patent office, the inventor meets men who are conversant with his art and employ the same technical language. In court, the inventor is confronted with a new situation. The judges are unfamiliar with the art. They do not understand the terms by which ideas are expressed regarding it.

It has been held by the Eighth C. C. A.:

"In the construction of patents and the application of the laws to the facts the patent presents, words must be given the same meaning that the patentee gave them, and must be used to designate the same things that they used them to designate or nothing but confusion and mysification can result."

Yet this court, after stating the correct principle, gave the flat arch and mathematical flat plate not the meaning the respective patentees gave them in their specification, but employed them with no regard to the thickness of the plate for arch action on the one hand or the permissible thinness on the other hand made possible by the arrangement of metal in two tension zones in mat formation to imitate the action of the momogeneous plate. The fundamental relations which determine the mode of operation, economy, feasibility and carrying capacity of a given amount of material, were lost sight of entirely in a mere superficial consideration of the flat top and bottom surface found in the stone slabs of ancient Egyptian and Greek temples as well as in present day concrete and stone flooring of concrete and metal.

A court of appeals of technical men having competent scientific ability in addition to legal knowledge would eliminate such misunderstanding of language, confusion of terms and multiplicity of error in which the lack of mechanical training entangles the court possessing a high order of legal attainment but lacking in technical knowledge.

The underlying difficulty with all questions of mechanics lies in the fact that natural laws are not in general apparent but hidden. Thus the remarkable philosopher Gallileo was punished by the court because of his teaching the doctrine that the earth moved around the sun. The Court believed they could see the sun revolving around the earth every twenty-four hours and punished the presumptuous philosopher for his theory to the contrary. The inventor's experience in the present day courts is a duplication of that of the philosopher in the dark ages.

Honesty of Witnesses No Test of Mechanical Truth

Mechanical truth in present day courts is tested not by mathematical rules and principles of exact science. but by the belief of the court in honesty of the witnesses.

This is the method by which criminal cases are adjudicated and is the only method by which such cases, questions of specific performance of contract and similar matters of equity can be logically determined. In the technical cause, however, the honesty of the witness does not determine mechanical truth. In fact it is no wise related to it. The witness may be honest but wholly ignorant of the matter concerning which he gives testimony. How, then, can a non-technical judge be expected to arrive at correct conclusions, unless the court is equipped to apply mathematical reasoning and separate mechanical truth from honest misconception?

An advantage which a technical court of appeals would have over the present method would lie in the application of philosophic truths and fundamental natural laws as a means to determine not the honesty of the technical testimony given but the accuracy and scientific truth thereof upon which under the theory of the law such matters should be determined.

For example, the true meaning and legal sufficiency of the specification has been defined by the early English decision in Aekwright vs. Nightingale (C. P. 1775) as follows:

"The specification is addressed to persons in the profession having skill in the subject and not to men of ignorance and if it is understood by persons whose business leads them to be conversant with such subjects it is a sufficient specification under the law."

This test of the sufficiency of the specification has been affirmed under our system in the holding of the Supreme Court in Carnegie v. Cambria, 185 U. S., 403, 46 L. Ed. 968:

"The patent is not addressed to lawyers or even to the public generally, but the manufacturers of steel and any description which is sufficient to apprise them in the language of the art of the definite feature of the invention . . . is sufficiently definite to sustain the patent."

Nevertheless, it is a fact that questions of validity and infringement depending on the true meaning of the claims as interpreted in the light of the specification is left by our statute to be decided by judges who are not persons having skill in the subject matter and conversant with it.

Now if the sufficiency of a specification to make it valid under the law be such that though it is not understood by those whose business has not led them to be conversant with the subject matter, as is the case of the judges, their failure to understand it would obviously result in inharmonious views and the application of diverse rules of law to the same state of facts, because of the difference in viewpoint taken. Where the decision arrived at is based on the uncertain character of the best understanding the judge could arrive at, while inefficient to pass on the questions at issue, the mathematical probability that two independent courts could possibly render harmonious and logically consistent decisions is so remote that the mathematical probability in favor of their conflict amounts to almost a certainty.

Again, in case where the courts through ignorance of the subject matter, inadvertently and unintentionally determine legal facts contradictory of and inharmonious with natural laws, the probability is equally great that two different courts will write opinions inharmonious and conflicting with each other.

The remedy is obvious. The enactment of a statute requiring that the question of the validity of a United States patent shall be passed upon by a court possessing competent scientific ability to understand the subject matter, just the same as is required by the existing statute as a qualification of Examiners in Chief in the Patent Office, to enable them to pass upon the allowance of patent grants. The system would then become harmonious and not be such a house divided against itself, but then an unscientific court reverses the Patent Office expert on ten or fifteen scientific questions in one and the same decision.

What must the engineer think of the Court of Appeals, passing upon the mechanical operation of a floor structure who were astonished at the idea that a floor

actually deflected under load? In other words, what must the engineer think of a Court of Appeals that had never heard of Hooke's law and were undertaking to pass upon one of the most complex problems in the mechanical field of elastic resistance?

What must the engineer think of a court that held that all the engineer did was to put the steel in where the strains come any way in an indeterminate structure, thus putting the cart, figuratively, before the horse, since by the distribution of rigidity the presence or absence of stress and strain in certain portions of the structure are automatically determined?

What must he think of the unscientific methods of such a court when the principles of rigidities, law of least work and its application, is completely explained and fully illustrated in the record placed before it?

Is not a trial of that kind a farce, a disgrace to our present state of scientific achievement? Are we to continue to have men decide scientific questions that are more than five centuries behind the scientific progress of the day?

Perhaps the foregoing may be over the head of the lay reader and it would be better to drive home the point by a discussion of the Supreme Court decision on the pencil tip case. This case involved the ordinary rubber eraser in which a cylindrical hole is provided in the rubber much smaller than the diameter of the pencil to be inserted therein, and the portion of the tip which encircles the pencil is made with a thin lip, increasing in conical shape toward the nub or body of the rubber. In arguing the case, the attorney for the plaintiff was wholly lacking in diplomacy. He argued before the Supreme Court that the Patent Office had decided upon the question of patentability and because the examiners were technical men their decision should be final. The argument indeed was weighty but it was undiplomatic to present and it was received as an exhibit of "lese majistat" to the acumen and understanding of the supreme court, who severely rebuked the undiplomatic attorney by holding the rubber tip was nothing more than providing a hole in a piece of rubber and inserting the pencil therein, and that putting a hole in a piece of material did not constitute patentable invention.

Now let us examine this matter from the mechanical standpoint. If you take a piece of solid vulcanized rubber and provide a hole in it much smaller than the end of the pencil it would be impossible to insert the pencil in the hole without whittling a conical point of inclined plane on the end of the pencil so as to wedge out the hole in the rubber to such dimensions as would enable the whittled down end of the pencil to enter the hole and be gripped by the mass of the rubber. The inventor has provided the inclined plane in the rubber itself by providing a thin lip to the tip which may be stretched over the square end of the pencil and by its elasticity forms an inclined plane by which the end of the pencil may be pushed into the aperture. The increasing thickness of the tip prevents its buckling as the pencil is forced home, and thus from the mechanical standpoint the rubber tip is a beautiful invention, possible only with the material India rubber, an invention which has never been improved upon from the day it was made to the present time, and yet it was held no invention by the Supreme Court, who lacked mechanical understanding to comprehend the beauty and simplicity of the invention. The grip of the rubber has no longitudinal component tending to cause the rubber to fly off as would be the case were an inclined plane whittled on the end of the pencil to force the hole to the diameter of the pencil.

Thus many of the most valuable inventions are wholly misunderstood by our courts and the inventor is *punished* rather than rewarded for their reproduction.

Another such case is that of the suspension hanger used on every street railway motor throughout the length and breadth of the land. Innumerable number of other cases might be cited from ample supply of evidence but repetition would be needless. Only typical examples are necessary to point the remedy. The creation of a Patent Court of Appeals protecting the public at large from future robberies and making it possible for the inventor to receive the awards he is justly entitled to and which our Constitution so intended, should on its merits be given early and impartial consideraion.

Responsibility for this unsatisfactory state of affairs lies solely with Congress. The judiciary are blameworthy to but a limited extent. Continued application of the methods of the civil or criminal case unfits them for the adjudication of scientific questions. Weighing technical evidence by any other standard than that of scientific truth and independently testing it by basic principles is so diverse from the quasi logical methods of weighing evidence for the honesty of the witnesses hat different standards and training are essential to satisfactory results.

In concluding this criticism fairness demands acknowledgment of the sound logic and painstaking effort of the judiciary in evolving a highly perfected system of rules of equity—which if properly applied would produce results above criticism. The system of rules of equity differs from the perfect modern machine—they are not automatic and require a highly developed scientific intelligence for their accurate application.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of Cement & Engineering News, published Monthly, at Chicago, Ill., for April 1st, 1921.

STATE OF ILLINOIS]
} ss.
COUNTY OF COOK]

Before me, a Notary in and for the State and county aforesaid, personally appeared John F. Waldron, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the Cement & Engineering News, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1 That the names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher, Wm. Seafert, 22 Quincy St., Chicago, Ill.
Editor, Wm. Seafert, 22 Quincy St., Chicago, Ill.
Managing Editor, Wm. Seafert, 22 Quincy St., Chicago, Ill.
Business Manager, John F. Waldron, 22 Quincy St., Chicago, Ill.

2. That the owners are: Wm. Seafert (sole owner), 22 Quincy St., Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)
None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

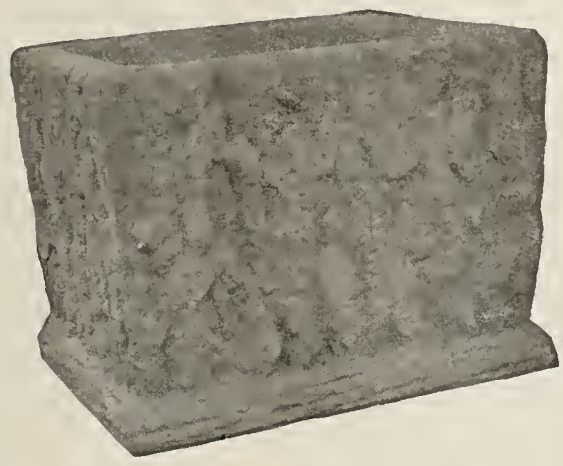
JOHN F. WALDRON,
Business Manager.

Sworn to and subscribed before me this 29th day of March, 1921.

[Seal.] FRANK W. McVICKER,
Notary.

Concrete Ornamental Moulds

Never before in the history of concrete work has the use of concrete been so great for ornamental purposes as at the present time. There seems to be no limit to the possibilities in this line and concrete lends itself so readily to the manufacture of ornamental articles that it proves most attractive and a very interesting line of work. There is a satisfaction about turning out a handsome piece of work that appeals to every concrete worker, and the profits in this line are also very satisfactory. Every housewife wants a pair of vases as soon as she sees them. The illustrations show very attractive and beautiful lawn vases. Molds for making such concrete vases and other ornamental work, such as porch columns, are made by W. E. Dunn Mfg. Co., 414 24th St., Holland, Mich., and Ideal Concrete Machinery Co., 1318 Monmouth Ave., Cincinnati, Ohio. Their new catalogs show the largest line of ornamental molds made. It will pay contractors and concrete product manufacturers to have a copy of their book if for nothing else than for reference. It describes everything shown in the concrete machinery line and gives much valuable information of every description. All molds for ornamental purposes are all made in four sections and are hinged so as to draw easily from the finished mold. The designs are clear cut and attractive in appearance and every concrete product manufacturer will do well to consider the establishment of an ornamental department in connection with their regular business. Every article produced will prove an advertisement for their work and every live, up-to-date concrete man realizes that they cannot do business without advertising. There are a hundred and one different ways in which articles of this kind tend to bring added sales to their business, and will increase their profits to a large extent, and put their business on a more satisfactory and profitable basis. Write both the Dunn Co., and the Ideal Company today for a copy of their ornamental mold catalog.



Revised Price List Ready

We are informed by the Link-Belt Company, Chicago and Philadelphia, that their new 272-page revised price list No. 334 has just been received from the printer, and will be mailed to all of our readers who send for a copy.

Saving Cement and Cement Sacks

In building the new $2,000,000 concrete factory building, at Cleveland, for the Fisher Body Company, where the concrete aggregated approximately 50,000 cubic yards, spread over an expanse of about 2,500 feet in length, the cement bags, of which there were close to half a million, were shaken with most satisfactory results by two electrically driven Handy shakers, and baled with two standard hand-operated Handy baling machines, manufactured by the Handy Sack Baler Co., 620 S. 2nd Street, Cedar Rapids, Ia., writes V. E. Winell, superintendent Thompson Starrett Co., Contractors, 701 Lincoln Bldg., Detroit, Mich.

Gravel Plant Increases Output By Night Operations With Cableway

When the new plant of the Premier Sand & Gravel Co. at Jackson's Lake, Ala., was erected last year, the company officials had an idea that its output of 20 cars of washed and screened material per 8-hour day would take care of the trade in their immediate territory for some time to come.

However, the unexpected demand for their product has already caused Mr. W. H. Brooks, general manager, to consider ways and means of doubling or perhaps trebling the capacity of the plant. For the present, the matter has been solved by running the plant two shifts, day and night.

Pit of Premier Sand & Gravel Co., showing Sauerman Dragline Cableway Excavator

As the company is using 600 ft. span, 1½ cu. yd, Sauerman Dragline Cableway Excavator that excavates and conveys the material direct from the pit to the hopper on top of the plant, it is comparatively easy to continue at night. A flood light on top of the cableway mast and several large incandescent lamps on the sides of the bins throw sufficient light on both the pit and the equipment to enable the operator to handle the cableway almost as rapidly at night as in the day-time.

The accompanying daylight photograph shows the plant with the cableway bucket bringing up a load of material from under water.

Announcing Lower Prices

The shrinkage in business has given us an opportunity to restore the economies in manufacture that had to be sacrificed during the high pressure of the past three years, writes Link-Belt Company, Chicago and Philadelphia.

Our overhead expenses have been reduced, the efficiency and output of our men have been increased, our raw materials have been marked down to the present market.

All of the reductions in cost effected through these steps, together with a considerable portion of our profits, have been applied to price reductions.

This general price reduction applies to our complete lines of Elevating and Conveying Machinery, our Malleable Iron and "SS" Class Steel Chains, Malleable Iron Buckets, and Sprocket Wheels.

The new and revised list prices are contained in our Revised General Price List No. 334. Copies sent on request.

Fence Post Moulds

Ideal Concrete Machinery Co., 1318 Monmouth Street, Cincinnati, O., manufactures molds for making concrete fence posts. Concrete is poured into the molds and spaded so as to exclude the air. The mold is then left for the concrete to set until posts can be removed and further cured. Forms are usually sold in a battery or set of six. With the forms are included stands and staple benders. Staples are imbedded in the posts when the posts are poured. Forms are furnished in either 7 or 7½ ft. lengths. Posts are triangular in cross section and are larger at the bottom than at the top. Further details may be obtained by writing to the manufacturer. The W. E. Dunn Mfg. Co., 414 24th St., Holland, Mich., also make molds for concrete posts. Their molds make four to ten reinforced concrete fence posts at a time and assure a high quality post at a low cost of manufacture. Write both the Ideal Co., and the Dunn Company for their fence post mold catalogs.

New Lime Hydrating Plants

The Cheney Lime Co., Allgood, Ala., is completing, and expects to have in operation about April 25th, a hydrating plant which will have a capacity of approximately 10 tons per hour. This is installed in a building 50 ft. x 110 ft. and storage for 20,000 bags of hydrated lime is provided for. The plant will be equipped with a No. 1 pulverizer, a four-spout Urschell-Bates packer and other standard equipment. One additional kiln has recently been added to the plant, and a Sanderson-Cyclone well drill installed. In addition a gasoline locomotive has been installed for handling rock from the quarry face to the kilns and crusher.

The capacity of this plant in quick lime is now about 25,000 tons annually.

The Florida Lime Co., Ocala, Fla., is putting up a new rotary kiln manufactured by the Vulcan Iron Co., 6 ft. x 10 ft., with a capacity of 50 tons of lime. A complete hydrating plant is being installed.

The company is also putting in a crusher and screens of 150 tons capacity, for road material. A steam shovel will be installed to handle material in quarry.

Kenyon Cotton Rope the Best for Power Transmission. Will last 3 or 4 times longer than Manila Rope

The various advantages of cotton rope are almost unknown in the country, but its superiority for certain types of service has been recognized for over a half century on the continent where it has been used almost exclusively for power transmission purposes.

In securing the exclusive agency for Kenyon Cotton Rope in the United States and Canada, the Dodge Sales & Engineering Company of Mishawaka, Ind., feel they have made a connection which will enable them to place on the market a power transmission unit on a par with the quality of their other products.

Kenyon Cotton Rope is manufactured by William Kenyon & Son, Ltd., of Dunkinsfield, near Manchester, Eng., who are the world's largest manufacturers of cotton rope for power transmission purposes. The Kenyon organization was formed in 1863 and the control has remained continuously in the hands of the family, the third generation now being in command. Kenyon Cotton Rope is made in six factories, four of which are located in England and two in France.

Kenyon Cotton Rope is primarily distinguished by a certain principle of inter-stranding which is made possible by specially designed machines developed by Mr. William Kenyon of the second generation. The Kenyon organization have made a deep study, not only of the technique of manufacturing, but of analysis of the use of rope under all diversified and varied burdens of service.

The construction of Kenyon Cotton Rope is especially interesting; the patent inter-stranding consists of a series of twisting operations, first the yarns, then the threads, and afterward the strands, these being finally locked together by reversing the turn. This results in a trinty of elastic spirals acting in unison and so wedged into each other that they will bend pliantly without undue wear or without distributing the relationship.

Kenyon Cotton Rope is the nearest approach to certain power transmission requirements yet devised. Each of the strands is composed of a succession of sheaths or layers of yarn which may be peeled off until the center is reached. This overlapping process has the effect of graduating the length of the threads in accordance with the thickness of the rope. The inter-stranding arrangement also insures a more compact mass of fibres than may be compressed into the same area by any other method, thus giving the rope greater driving force, exceptionally long life, and immunity from undue stretching.

Ordinarily, it is figured, Kenyon Cotton Rope will outlast manila rope; that is, if a manila rope lasted one year on a certain drive, it is safe to say that Kenyon Cotton Rope will last three to four times as long under similar service and conditions.

While manila rope wears on the outside, the principal wear takes place on the inside, due to the continual sliding of the fibres, one on the other, as the rope is bent around the sheaves.

Kenyon Cotton Rope will run successfully over sheaves much smaller than is possible with manila rope. This makes it specially useful in small-sheave-high-speed work. In this particular type of work it will deliver a maximum of service with a minimum of service with a minimum of wear.

Kenyon Cotton Rope is being used in this country by a number of industries among which are steel mills, electrical companies, textile manufacturers and cement manufacturers and they are all enthusiastic over its many qualities as compared with manila rope used in previous installations.

The Conco Transfer Cars

Every up to date concrete products plant has found the necessity of an efficient and easy running transfer car, as it permits of tracks being placed parallel without having a number of switches, which take a great deal more work in installing and much more labor in moving the cars from the kiln to the tile or block machines.

The Conco Car manufactured by H. D. Conkey & Co., Mendota, Ill., is a very efficient and convenient arrangement, as will be readily seen from the cut shown here. The regular curing cars can be easily

run onto the transfer car, as it fits in the regular track. It is then an easy matter to push the transfer carrying the curing car to any track further on.

The up to date plant finds this arrangement not only gives them more room by eliminating the extra switches, tracks, etc., but makes it possible to transfer cars from one track to the other very easily, and thus save labor and time.

Conco transfer cars are being used by most of the plants that are equipped with Conco tile and block cars, and are being found very satisfactory in every respect.

New Stucco Developed

Mr. J. S. Small of the Small Concrete Brick Co., Piqua, O., has developed a stucco with limestone quarry screenings using gypsum plaster as a base, which he declares is superior to any other kind of stucco that he has ever used. He has been in the contracting business for a great number of years.

Mr. Small describes his stucco as composed of equal parts of calcined gypsum and fine limestone screenings. He mixes very small batches at a time, because, of course, it sets very quickly, and cannot be used after it has once set. It can be applied over brick lath or any kind of surface; and he says it will not crack and weathers perfectly.

Who Is to Blame?

An Incident With a Good Moral for all Cement Products Manufacturers—Good Points on Cement Pipe Making

By R. M. Stedman

A short time ago a letter was received from a party who had been manufacturing concrete drain tile for some time. It outlined a disagreeable experience he had had, because he had shipped a product in one instance which was not all that could be desired in so far as quality and standard were concerned. He went on to state that in the manufacture of his products he had been accustomed to using not one, but many brands of Portland cement. He made the statement that he believed the difficulties he had experienced were due to the cement.

How often does the average cement and concrete contractor or other user try to shirk the responsibilities of poor workmanship by placing the blame unjustly and hurriedly upon the cement!

As a matter of fact, Portland cement is a manufactured product, and the care exercised in this manufacturing process would prove a fitting example to be carefully followed by the average concrete products manufacturer, as well as the concrete contractor.

Fault of the Bank Run

Upon investigating the trouble we learned that this particular product which had given him trouble had been made of a mixture of Portland cement and bank run gravel in the proportions of 1 cement to 5½ bank run material!

To the intelligent and conscientious user of cement and manufacturer of concrete drain tile, this statement in itself indicates the cause of the difficulty.

The question of manufacturing concrete products today is receiving more careful consideration than at any other time, and the leading and wide-awake manufacturers are beginning to appreciate the wonderful and beneficial results of using scientific proportioning and selection of materials.

It is not a question of what particular brand of cement is used, but rather how this cement is used. In the manufacture of concrete products, certain recommended practice is well worthy of consideration. This applies not alone to the manufacture of concrete drain tile and sewer pipe, but to all other products as well.

Portland cement used should meet the requirements of the Standard Specifications for Portland Cement of the American Society for Testing Materials.

Selection of Aggregate Important

Possibly the source of the greatest difficulty is in the selection of the fine and coarse aggregates. I doubt if any one thing has any greater bearing upon the ultimate product.

Fine aggregate should consist of sand, crushed stone, or gravel screenings, graded from fine to coarse; and, in the manufacture of drain tile and sewer pipe, should pass when dry a screen having 4 square meshes per linear inch. It is preferable that this fine aggregate should be of silicious material, clean, coarse and free from soft particles, loam, dust, vegetable or other deleterious matter. In selecting a fine aggregate not more than 20 per cent should pass a sieve of 50 meshes, while not more than 6 per cent should pass a sieve having 100 meshes per linear inch.

It is often advantageous to test the strength of a mortar composed of the fine aggregate selected for use. Such a mortar, composed of 1 part cement to 3 parts aggregate by weight, when made into briquettes should show a tensile strength equal to or greater than the strength of a 1 to 3 mortar of cement and standard Ottawa sand.

In the establishing of a concrete products plant, one of the first considerations is the available source of materials. It often happens that a sand pit is available. However, this being the case, under no circumstances should the material be used without previously having been screened and then remixed in the proper proportions. In this way a predetermined quality of pipe may be made by the judicious and careful use of fine and coarse aggregates.

In selecting material for coarse aggregate, gravel or crushed stone, graded in size and retained on a screen having 4 meshes per linear inch, should be selected. This coarse aggregate should be clean, hard and durable, free from dust, vegetable or other deleterious matter, and containing no soft or flat particles.

It has been the result of a great deal of study and investigation that the best proportions for making drain tile and sewer pipe have been found. For drain tile the recommended practice today places the proportions of 1 sack of cement to not more than 3 cubic feet of fine aggregate, this for drain tile up to and including 10 inches in diameter. Where it is desirable to manufacture drain tile larger than 10 inches in diameter, and it is desirable to use a coarse aggregate, the size of the maximum particles should not be more than ½ inch. This concrete should be mixed in the proportions of 1 sack of Portland cement to not more than 5 cubic feet of fine and coarse aggregate, measured separately, and in no case should the mixture contain more than 3 cubic feet of fine aggregate to each sack of cement. Drain tile, however, is not likely to be called upon to carry as extreme a load as is often imposed upon sewer pipe.

In the manufacture of sewer pipe up to and including those of 10 inches in diameter, it is recommended that the concrete be mixed in the proportions of 1 sack of Portland cement to not more than 2½ cubic feet of aggregate. Above 10 inches in diameter the proportions should be 1 sack of cement to not more than 4 cubic feet of fine and coarse aggregate, measured separately; and in no case should the mixture contain more than 2½ cubic feet of fine aggregate to each sack of cement.

The amount of water used should be sufficient to make the concrete as wet as can be used and still allow the immediate removal of the outer form from the pipe or tile. One of the best indications to show that the concrete is of the required consistency is the web-like markings on the surface of the tile, or, as it is called, watermarks, indicating free moisture, which is discernible after the removal of the forms. The interior surface of the pipe and tile should show the trowel marks caused by free water coming to the surface under the troweling action of the revolving packer head or core, in case such is used.

It is of extreme importance that the pipe and tile be made of a cylindrical section, the size always being designated by the interior diameter. The thickness of the walls of the pipe and tile should be practically uniform throughout and should not be less than 1/10 of

the diameter, with a minimum thickness of ½ inch for drain tile and ¾ inch for sewer pipe.

To secure the proper hardness and strength in concrete drain tile and sewer pipe, these products undergo what is called "curing." This term, however, is hardly proper, and I believe the word "hardening" better expresses and indicates the desired operation. In order to permit of the proper hardening of concrete, and especially of concrete pipe and tile, it is necessary that rapid evaporation of the moisture content be eliminated. This hardening process may be conducted in a number of ways—by the use of steam rooms, by the use of water, and by a combination of both.

In being hardened in a steam room, the temperature should be raised and maintained to between 100 and 130 degrees Fahrenheit, in an atmosphere thoroughly saturated with water vapor.

Waterproofing Concrete by Hydrated Lime Process

Discusses Among Other Matters, the One Way Whereby Concrete May Be Made Watertight Without the Addition of Any Waterproofing Agent

By BELA NAGY

Chief Engineer, Hydrated Lime Bureau.

Concrete is impermeable or watertight when it does not permit the passage or flow of water through its pores or voids. If the pores or voids between the grains or in the individual grains are sufficiently large and connected from surface to surface of the wall, the concrete will be permeable to water.

It is only natural that any material or method whose purpose is to make concrete watertight must have for its aim the elimination of visible voids or structural defects and the reduction of the less visible passages by diminishing their size and filling them with finely distributed material of a colloidal nature.

Before discussing waterproofing by the addition of some material other than portland cement and aggregates, let us dispose of the one way whereby concrete may be made watertight without the addition of any waterproofing agent.

Against limited pressures concrete may be made practically watertight without the use of any other material than portland cement and the aggregates. This is possible only with sufficiently rich mixtures of the proper consistency selected aggregates carefully graded, and with supervision and workmanship.

Of course, the addition of any material will not compensate for ignorance or carelessness, but should assist in producing reliable results with ordinary care and less labor.

Such material should possess the following characteristics:

1. It should be easily mixed with water and the other ingredients of concrete.
2. It should in no way injure the concrete either chemically or physically.
3. It should enter the mixture in its most effective form and not rely for its waterproofing effect on chemical reaction with any of the ingredients of concrete. It should be permanent and not subject to decomposition or decay and therefore it should be a mineral compound, rather than organic.
4. The material should be finely divided, bulky and preferably of a colloidal nature, so as to lubricate the mass during handling and placing and act as a void filler in the hardened concrete.
5. It should be inexpensive so as not to increase the cost of concrete materially.
6. It should be obtainable wherever cement is used or sold.
7. It should be easy to proportion, handle and incorporate in the mix.

It is not our purpose to discuss integral waterproofing compounds in general, but rather to show how nearly hydrated lime fulfils these requirements and accomplishes its work of making concrete watertight.

Hydrated lime is a dry, flocculent powder produced by the slaking of quicklime under standardized factory conditions and expert supervision.

It makes concrete watertight by a three-fold action. First by reducing the possibility of visible, physical defects, second by reducing the size of the interstices or voids, third, by acting as a void filler.

Hydrated lime is a very plastic material of construction and has been used for years in mortar, plaster and stucco. It easily unites with water. After being wetted, it loses its granular character and is converted into a smooth colloidal paste that imparts great mobility to concrete to which it is added.

On account of its lubricating properties toward external objects it will slide through chutes at a smaller angle for a longer distance than concrete without it; it will fill the forms more perfectly with less spading and surround the reinforcing steel more closely. And all this occurs without the use of an excess of water and at such a consistency that the paste is firm enough to keep both the fine and coarse aggregates in suspension and uniformly distributed throughout the mass, resulting in a more homogeneous, dense and strong concrete with better exterior surfaces.

If we consider the fact that concrete, as proven by Bureau of Standards and other tests, containing an excess of water may be several hundred per cent weaker than one with the right amount, any agent that permits concrete to be handled at the right consistency, without an excess of water, is a factor of safety added in the field.

Considering hydrated lime purely as a waterproofing, it produces watertight concrete by eliminating larger structural voids through right consistency of the mass; it reduces the smaller voids and pores through precluding the use of an excess of water and through internal lubrication which permits the particles to easily slide over and past each other, thereby ranging in the most advantageous position and finally by filling even the small pores with a finely divided, colloidal mass.

There is a further action which takes place in the interior of the hardened concrete which is of the greatest importance. The hydrated lime holds water mechanically bound and materially retards its evaporation. After the portland cement has used up the water in direct contact with it for its early hydration, it draws on the water held by the hydrated lime, and this serves for further hydration of the cement and the development of the colloid, which factors are of extreme importance both for the increase of strength and water-tightness. This must be apparent to all who know how important it is to keep the hardened concrete well supplied with moisture during it searly age.

It is well known that if concrete is permitted to dry out shortly after its hardening, or, in other words, before it has acquired sufficient tensile strength, it will contract and check or crack. And of course the effectiveness of waterproofing is destroyed when a break of continuity occurs in the concrete. In later age also hydrated lime has the effect of preventing rapid moisture changes in the concrete which is important in reducing expansion and contraction caused by alternate wetting and drying.

The handling of this material is easy as it is marketed mostly in paper bags of 40 to 50 pounds net weight, although it is obtainable in 100-pound cloth bags. The proportioning and addition to the other materials does not require any complicated preparation. According to the proportion to be used a certain amount of hydrated lime is introduced into the mixer for each sack of portland cement used.

One 2-gallon pailful of hydrated lime weighs approximately 10 pounds, which is sufficiently close for practical purposes.

Giant Griffin Mill

The following interesting description of the Griffin Mill is taken from the latest catalog of Bradley Pulverizer Co., Allentown, Pa., manufacturers of this dependable grinding machine, viz.:

"The principle on which the Giant Griffin Mill is founded was made use of by the American Indian, who pulverized his corn between two stones. Here the grinding was accomplished by pressure and friction created by the rubbing together of two smooth hard surfaces, between which was placed the material to be pulverized.

"In the operation of the Giant Griffin Mill, this principle is carried to the highest state of perfection by means of a chilled iron roll hung on a control shaft and revolved against and around a steel die at a speed that through centrifugal force creates a pressure between the roll and the die where it comes in contact with the material to be pulverized, of approximately 15,000 pounds per square inch. This tremendous pressure is exerted in combination with the grinding action produced by slippage of the roll; the travel of which around the inside of the die ring is in the opposite direction to the rotation of the driving pulley. The latter drives the central shaft and roll through the medium of a universal joint. Thus in a few words we explain the fundamental grinding principle of the Griffin Mill. It is the old mortar and pestle principle mechanically perfected, and has been termed by many operators and engineers as the "rub and roll action." This principle has won for the Griffin Mill the distinction of being first among the many pulverizers of refractory materials on the market; the material being reduced to the finest state not only by pressure of the roll against the die but by slipping of the roll on its path around the die.

"After the material has been thoroughly pulverized between the roll and die and also by attrition it is discharged through the internal screen surrounding the grinding chamber. The passage of the finished material through the screen is caused by air circulation resulting from the action of the roll revolving speedily around the die. In addition natural air suction from the grinding chamber through the discharge passage from the mill is aided by the heat generated by the grinding process. This method insures a uniform product of very fine material. It is a known fact that the Griffin Mill principle produces more impalpable powder than that of any other pulverizing action.

"It is found advantageous to equip the mill with a vertical stack at the discharge opening through the base in order to create a slight down draft through the mill to assist this current of air through the grinding chamber. This suction is not great enough to lift the coarser particles and allows them to remain in the grinding chamber until thoroughly pulverized. This partially accounts for the large amount of impalpable powder found in the finished product which is so much desired by cement manufacturers who wish to make a superior grade of Portland Cement.

"Our Improved Giant Griffin Mill is the outcome of thirty-one years' experience in the construction and operation of this type of pulverizer. It is a single stage mill capable of receiving material up to ¾-inch for feed and reducing same to the desired fineness, and doing this in one operation, all the material passing out of the mill being finished product of uniform fineness. The fineness is obtained by regulating the mesh of the screen used on the mill.

"Fundamentally the Griffin Mill is an extremely fine grinding machine but if desired the operator can, by the simple operation of changing the screen on the mill, produce materials of various fineness, making it an extremely flexible grinding unit. It is adapted to wet as well as dry grinding, and has proven very successful when grinding wet raw materials in cement plants. Also used very successfully as preliminary pulverizer of cement materials.

"No other type of pulverizer or combination of pulverizers have ever equalled this mill's record for economical operation both from a power and maintenance standpoint.

"During the last few years many improvements have been made in the design and construction of the Griffin Mill and the Improved Giant Griffin Mill embodies these very latest designs. We would especially call your attention to the fact that the pulley body now used on the Improved Griffin Mill is so designed that all of the wearing parts operate in a bath of oil (Pat. 1095986). It is obvious that by so operating, the length of life of the wearing parts is greatly increased, reducing the maintenance cost to the minimum and due to the fact that the oil is retained in the pulley body, the oil consumption of the grinding unit is extremely small, so low in fact, that the cost of oil for lubrication ceases to be a factor in the cost of operation.

"Griffin Mills are used by most of the largest and successful cement plants in the United States, England, Canada, South America, France, Italy and other European and Asiatic countries. They are also in general use by fertilizer manufacturers, agricultural limestone producers and are adapted to the grinding of feldspar, slate, coal, coke, chrome ore and all other dried refractory materials where a uniformly ground finished product is required.

Cars of Various Kinds

The Continental Car Co. of America, Inc., Louisville, Ky., who have for 15 years manufactured dump cars of different kinds for various purposes, have issued a handsome new catalog with full descriptions, accompanied by illustrations showing cars engaged in a great variety of work. The policy of the company is expressed in their steady adherence to the ideal of maintaining the strength and efficiency of their products at all costs, and the good-will thus built into them has placed them in a front-rank position in the market.

Effect of Sea Water on Concrete Structures

Experience with Piers at Annapolis Royal, N. S.— Piers of Concrete on Cribwork—Analysis of Cement Used—Surface Treatment—Marked Surface Disintegration—Theories of Deterioration—Frost a Destructive Agent—Disintegration Slowing Up

By C. E. W. Dodwell District Engineer, Public Works Department, Halifax, N. S.

Between the years 1907-1914 the department of public works of the federal government of Canada, under the direction of the author as district engineer in charge, constructed a line of ten piers across the river, about a quarter of a mile above the town of Annapolis Royal, N. S., with the primary object of preventing ice from drifting up and down with ebb and flood tide, and thus endangering shipping. The width of the river at the site of the piers is, at low water, about 740 ft., and rather more than double this width at high water. The piers were not built solely as ice piers, although they adequately serve this purpose, but they are also capable of being used as a sub-structure for a highway bridge. Had they been built solely for the former purpose, the piers would have been constructed from bottom to top of crib-work of round logs of timber, notched and well bolted at the intersections and filled with stone ballast, whilst if the ultimate use as a bridge had been intended they would have probably been built of solid concrete faced with granite. The adopted design is believed to be the most practicable combination of minimum cost with minimum permissible permanence and stability.

Construction Type of Piers

The lower portions of piers 1 to 5, inclusive, are of creosoted square timber, 12 in. by 10 in. in section, filled with stone ballast. The timber was treated with 14 lb. of oil per cubic foot. The upper portions of these piers and all of pier 6 to 10 inclusive are of concrete. The lower portions of piers 6 and 7 are encased in watertight cribs, built of squared spruce. The piers from 1 ft. below to 5 ft. above low water are faced or sheathed with birch (*Betula lutea*) plank 5 in thick, and the corners are further protected by ½-in steel cover plates.

The cribs were floated into position at low water, and, the period of slack water being brief, great care and expedition were necessary to get them into correct position, and to hold them while they were sunk, as quickly as possible by ballasting with rock, and by releasing the crasks placed around them to give the buoyancy rendered necessary by the high specific gravity of the creosoted timber. Large anchors (about 3 tons each), 3 up and 3 down stream, on steel wire hawsers, adjustable with block and tackle, assured the final and correct positions of each crib.

Cement Used

The cement used in piers 1, 2 and 3 was "Lehigh," an excellent American Portland of the following qualities by test:—

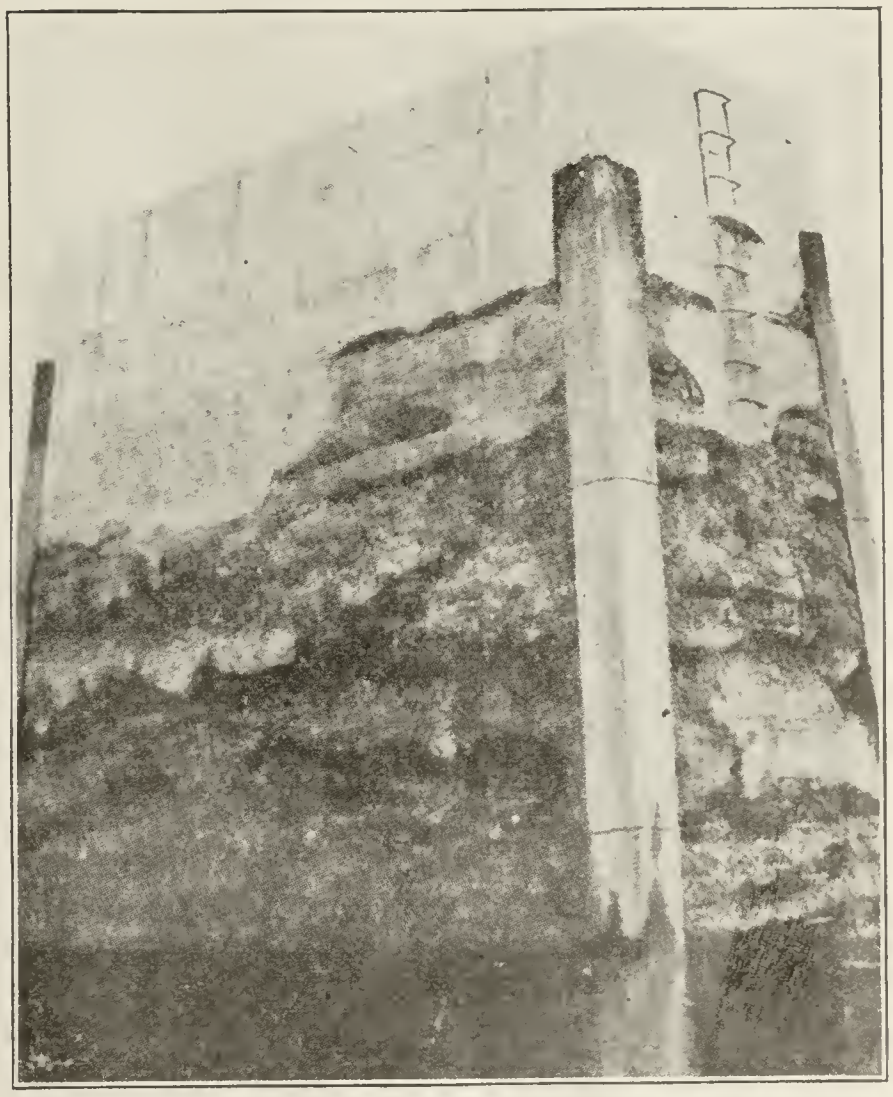
Specific gravity	3.125
Fineness:—Passing No. 50 sieve	.16%
Passing No. 100 sieve	5.88%
Passing No. 200 sieve	24.20%
Initial set of neat cement	1 hr. 34 min.
Full set of neat cement	4 hr. 49 min.
Percentage of water used	22
Average tensile strength of neat cement, 1 day in air and 6 in water	655 lb. per sq. in.
Average tensile strength, 1 cement, 3 sand, 1 day in air and 6 in water	265 lb. per sq. in.

Chemical Analysis

Silica	22.76%
Alumina and ferric oxide	10.50%
Lime	61.60%
Magnesia	1.95%
Sulph. anhydride	1.65%
Loss on ignition	1.55%

The concrete in piers 1, 2 and 3, built in May and June, 1910, was composed of 1 volume of cement, 3 of clean, coarse pit sand and 3 parts of stone, broken to pass through a 2-in. ring. Displacers of "plums" of sound, clean stone, not exceeding 2 cu. ft. each, not less than 6 in, apart, or 9 in. from any face, were laid as the work progressed.

The specification provided that, as soon as the moulds had been removed, the sides and top of each



pier were to be rendered with a cream of equal parts of sand and cement, trowelled to a smooth surface. On the top and the upper 4 or 5 ft. of the sides of the piers this skin coat held pretty well, but below high-water mark it did not survive the first winter, owing to the difficulty in getting proper bond with the concrete that had been twice daily submerged.

The accompanying photograph shows the effects of the seven years' exposure of a typical pier, No. 2, to (a) the attacks of floating ice, and (b) the alternate freeze and thaw to which the rise and fall of tide subjected it.

It should be realized that it is impossible to determine the proportions of the disintegration of the surface concrete of the piers herewith described, due to these two influences, respectively. The author's opinion, is that frost has had the major influence, but opinions are not evidence. No concrete is absolutely impervious, however rich it may be, however well

rammed, or however excellent the quality of its several constituents. At high tide water penetrates its surface, if only to the depth of the fiftieth part of an inch. In a Nova Scotia winter the thermometer may be several degrees below zero F., and, as the tide recedes, the water in the concrete freezes, expanding as it does so. So long as the water in the surface of the concrete remains frozen, nothing appears to happen, but as soon as the tide again rises and the skin-water thaws the surface film of concrete falls off in powder. This action going on twice in the 24 hours during the four or five months of winter must inevitably result in the more or less rapid disintegration of the face of any concrete exposed to such influences. That abrading action of floating ice also contributes to the disintegration of the concrete cannot, of course, be denied, for the illustration shows a number of steps (of 1-in. round iron) in the end of pier No. 2 much bent by the blows from floating blocks of ice, which must, therefore, strike or rub against the pier with considerable force.

Theories of Deterioration

The author's opinion is that (a) had it been possible to make the concrete absolutely impervious, it would have suffered very little from ice action, and that (b) had it been possible to prevent floating ice from touching the piers, they would have shown almost as much deterioration as they have suffered under the two influences of surface freeze and thaw and the impact of ice. The maximum depth to which the concrete has been removed is about 15 in., and this depth is reached in very few places only. The average depth is less than 6 in., so that the actual diminution of bulk is inconsiderable. It is a singular but unmistakable fact that the disintegrating influences are slower in action now than they were during the first year or two. The causes of this retardation are as yet not quite clear, but the author believes one of them to be the formation, growth or deposit of a coating or film of slime on the surface of the concrete (to which the blackness in the accompanying illustration is due), which protects it to a certain extent from: (a) The percolation of water; (b) the freezing of the skin-water while the tide is out, or (c) the falling away of the disintegrated surface film of concrete, and the consequent exposure of fresh surface.

As much as four or five years ago the author fully expected to have been obliged to adopt some means of protecting piers 1, 2 and 3 from further deterioration, but it now seems that this may be deferred for another year or two.

Variation in Disintegration

Piers Nos. 4 and 5 were built in June and July, 1912, and with five years' exposure they do not show nearly so much deterioration as piers 1, 2 and 3, though this may be due to other causes than the lapse of less time. The outer 9 in. in thickness of the concrete was composed of 1 of cement, 3 of sand and 1 of gravel, all the rest of the concrete being 1 cement, 3 sand, 2 broken stone and 2 gravel, displacers being used in the hearting. The cement was "White's" (English) and "Canada." The qualities of "White's" were:—

Specific gravity	3.073
Fineness:—Passing No. 50 sieve	.08%
Passing No. 100 sieve	1.44%
Passing No. 200 sieve	15.72%
Initial set of neat cement	1 hr. 32 min.
Full set of neat cement	3 hr. 37 min.
Percentage of water used	23
Average tensile strength of neat cement, 1 day in air and 6 in water	618 lb. per sq. in.
Average tensile strength, 1 cement, 3 sand, 1 day in air and 6 in water	287 lb. per sq. in.

Chemical Analysis

Silica	22.44%
Alumina and ferric oxide	9.14%
Lime	62.26%
Magnesia	1.98%
Sulph. anhydride	1.02%
Loss on ignition	1.75%

Several hundred tests of "Canada" neat cement, 1 day in air and 6 in water, gave an average tensile strength of 796 lb. per sq. in. and a maximum of 900 lb. Briquettes of 1 cement and 3 sand gave at equal time an average of 330 and a maximum of 360, both classes of tests showing a very small margin between the maximum and minimum, thus indicating a cement of a very uniform and satisfactory character.

Piers 6 to 10 (the concrete portions) were built in December, 1913, and January, 1914. They have, therefore, had only 3½ years' exposure, and show but little deterioration. The cement used was of three kinds, "White's," "Canada" and "Invicta," the last an English article of good quality, with tensile strengths of 640 and 306, respectively, neat, and 3 to 1, 1 day in air and 6 in water.

A Correction

J. M. Johnson, sales engineer of Allis-Chalmers Mfg. Co., Chicago office, should be given credit for the general design and layout of the new crushing plant of the Monmouth Stone Company, illustrated and described in the March issue of CEMENT AND ENGINEERING NEWS, which was worked out in detail by Allis-Chalmers engineering department in Milwaukee.

E. L. Shaw & Co., Chicago, made the detail drawings for the buildings. These drawings were made from the general dimensions and requirements established by Allis-Chalmers engineers.

The Importance of "Spading" Concrete

Probably there is no one operation in concreting more important than proper and thorough "spading." At this time of year when moisture, snow and frost are prevalent, one often notices the damp streaks, patches and defects that appear on concrete retaining walls and similar outside work. On examination it is found that every one of these defects consists of a porous spot where the moisture is absorbed and retained.

The porous place is invariably caused by inadequate spading or an entire lack of spading. This is proved beyond question by the fact that the streaks define the limits of the various layers or batches of concrete, as it was deposited in place. Spading would have prevented the delineation of the layers, because it would have consolidated them and covered the entire surface of the wall with a hard, impenetrable coat of rich mortar.

It is unfortunate that the name "spading" should have been first applied to this process, because it cannot be effectually carried out by means of a shovel or spade. A special spading tool or a strip of board beveled at one end to a chisel point is thrust down next the form with a churning motion to force the stone back and allow the mortar to flow against the forms.

A valuable means for assisting the spading process is the hammering upon the outside of the forms in order to insure the concrete settling down without air pockets or voids.

News of the Cement Mills

The Riverside Portland Cement Co., Riverside, Calif., has just installed at a cost of $100,000 a Brown Cantilever Crane, which has a radius of 110 ft., and will store 500,000 bbls. of clinker. The annual capacity of this plant is 2,000,000 bbls., using 500,000 bbls. of fuel oil for calcining.

R. H. Butchart, president, and Clark Moore, former sales manager of the Oregon Portland Cement Company, were found guilty on an indictment charging violation of the anti-trust laws, by a jury in federal court at Portland, Ore. Thirty days were allowed the defense to prepare motion for a new trial.

The convicted men have twice been on trial. The first jury disagreed. The indictment against the two men was returned in October, 1916, and charged that the men, as officials of the company, had entered into an agreement with other cement manufacturers along the coast, under which the territory in Oregon was divided up and monopolized in districts.

Hanover Portland Cement Co., Hanover, Ont., are now using marl in the manufacture of cement, but expect to change to limestone in the near future. The daily capacity will then be increased to 12,000 bbls.

The Colorado Portland Cement Co., Portland, Colo., develop their own electricity, using about 4,500 horse power. Their annual capacity is 1,100,000 barrels.

The Hercules Cement Corporation, Nazareth, Pa., are operating their plant to capacity, which has just been increased by the addition of two more kilns. Their well drilling is contracted for, but for secondary drilling they use tripod drills.

The Indiana Portland Cement Co., Greencastle, Ind., are going to build a new crushing plant at their quarry, to have a 42-in. gyratory and a secondary crusher. They operate two big blast hole electric drills and a gyratory crusher with 22-in. opening, also Smidth Kominuter and Smidth tube mill.

Cape Girardeau Portland Cement Co., Cape Girardeau, Mo., are installing a 1250 Kva steam turbine and 1400 horse power waste heat boiler which will double their capacity.

Announcement of a reduction of prices on cement, sand and gravel has been made by Missouri Portland Cement Co.

The new prices follow announcement of a wage reduction of 10 per cent, which was made several days ago by the company for all of its laborers.

Cement in sacks, in wagon lots, will be reduced approximately 17 per cent, according to the announcement. The reduction in the price of cement is only 10 cents a barrel, the greater reduction being in the price of sacks, from 25 cents each to 10 cents. The new price on cement in wagon load lots to contractors is $3.45 a barrel. The old price was $4.15. The carload lot price will be $3.

The price of sand and gravel to contractors is reduced from $2.60 a ton to $2.50.

H. L. Block, president of the company, says the reduction in prices will amount to more than the wage cut, unless the volume of business greatly increases. Common laborers now get 35 cents an hour, skilled laborers being graduated up to 70 cents.

Good progress is being made in the preliminary work at the site near Rapid City, S. D., where the state is preparing to install a $2,000,000 cement manufacturing plant. Workmen are engaged in putting down test holes on the ground. The drill passed through 38 feet of the purest cement materials, and the results of the analysis came up to the expectations of the geologists. Actual work on the construction of the plant is expected to be started before long.

The Newaygo Portland Cement Company re-elected officials at its annual meeting: President and treasurer, Clay H. Hollister; vice president, Wilder D. Stevens; vice president and general manager, J. B. John; secretary and assistant treasurer, W. A. Ansorge, and directors, the officers and P. H. Travis, Fred Vogel, Jr., Milwaukee; H. D. Higginbotham, Joliet, Ill., and Mrs. Daniel McCool.

C. A. Irwin, formerly president and general manager of the La Salle Cement Co., has been elected vice-president of the Alpha Portland Cement Co., and will have charge of the interests in the territory formerly served by the Burt Portland Cement Co., Bellevue, Mich., the Ironton Portland Cement Co., Ironton, O., and the La Salle Cement Co., at La Salle, Ill., all of which companies have been taken over by the Alpha Company with headquarters at 140 South Dearborn street, Chicago, Ill. Sales offices will also be continued at Bellevue, Mich., in charge of F. L. McClintock, district sales manager, and at Ironton, O., in charge of J. R. Paul, district sales manager.

The plant of the Castalia Portland Cement Co., Castalia, Ohio, has been greatly improved while closed down for the winter, Westinghouse motors having been installed so that all the machinery is now electrically driven. In every respect the plant is one of the most modern and complete in the country.

The improvements at the plant have given work to about 100 men during the winter, and with the starting of production last month from 130 to 140 is employed regularly.

"We are now shipping about 1,500 barrels a day, and prospects appear pretty good," said Walter S. Kirkpatrick, general superintendent. "There has been a decided improvement in the last two weeks."

The big plant of the Sandusky Cement Co. at Bay Bridge has been running with a full force all winter.

A bill has been reported out for passage in the state senate of Iowa that requires all sellers of cement to come under the administration of the state board of railroad commissioners. Where commission has been charged when the cement has been sold direct by the factory, this will not be allowed. The factories will be required to sell to the state and to public contractors, and will not be permitted to refuse. Violation of the act will be sufficient grounds for the issuing of an

injunction against further selling by the factory or other persons.

The suit of the Henry Cowell Lime & Cement Co., seeking an injunction restraining the Building Trades Council of San Jose, Calif., from boycotting the company's products, and claiming damages to the extent of $50,000 as the result of such boycott instituted last month before Judge J. R. Welch in the superior court. The attorney for the cement company charged that the placing of the products of the Cowell company on the "unfair list" has resulted in "irreparable losses" to the company.

A big job was left open in a big New York institution the other day.

"Whom can we promote to fill that place?" asked the Vice-president, who is also a director.

"We'll have to get so-and-so from such-and-such a place in California," the President answered.

"What's the matter with our organization that men won't grow in it?" asked the Director.

That is the question many big corporations have not answered. Some raise timid, one-sided personalities by a crop of promotions of untrained men who take no chances and make many mistakes. Others go "out to California." It sometimes takes a President's breath away when he goes into his garden to pick a real, upstanding man—and finds that *he hasn't any.*

"Every factory superintendent," says an executive, "wants men who—

"Do not have to ask too many questions;

"Have initiative;

"Can analyze the men under them and the work they are doing;

"Can intelligently choose lieutenants;

"Care not so much that the men under them are busy hustling about, but are more concerned as to what they are producing.

"Such men as these *know,* where others may only suspect; they do, while others wonder *what* to do.

"We build our organization around trained men. The better the training of all our men and the larger the number who are studying, that much easier is our job of finding competent leadership."

The cement industry, which was started in Japan in 1880 as a government project, is now represented by eighteen privately owned concerns with an annual output of 5,500,000 barrels. Of these the Onoda Cement Company is the first, and the Asano Company, with a capitalization of 13,045,000 yen and 14,131,000 yen of outstanding debentures is the largest, representing nearly one-half the capital engaged in the business. The products of all the concerns is, for the most part, marketed locally.

Vearl Swank, 30, workman at the Kosmosdale Cement Co., Kosmosdale, Ky., was crushed to death when he became entangled in machinery at the plant. His body, badly mangled, was found in the morning by Frank Veith, a fellow workman. It is believed that Swank's clothing caught in a shaft-line belt and he was drawn into the machinery. Both legs and arms were dismembered. Swank was employed as tube-mill roller.

Phoenix Portland Cement Co., Nazareth, Pa., is completing a 45-foot square sub-station, transformers and other apparatus being installed which will be utilized in the operation of the compartment tube mills, now being installed in the grinding department. The company has also installed a weightometers to weigh the coal used for burning at the kilns, as well as weighing the clinker output of each kiln. It has just completed and placed in operation a drag chain type water-cooled conveyor to handle hot clinkers to storage which is proving very satisfactory. This drag is of special design, and was manufactured in a local machine shop. The plant started operations following a 4 weeks shut-down, during which time the improvements were made.

United States Portland Cement Co., Concrete, Colo., has completed the installation of a third kiln, with the necessary supplementary machinery. The kiln is 9 by 125 feet and was made by the Vulcan Iron Works. F. L. Smidth kominuters and tube mills are used on the raw grind. Another Jeffrey pulverizer has been added for preliminary grinding on the raw side. A Ruggles dryer has been installed and a new coal dryer. The steel buildings covering the plant have been extended to accommodate a fourth kiln, for which machinery is now being purchased. It is the intention of the companies operating in Colorado to try to supply the requirements of consumers that are within shipping distance. The output of the Concrete plant, with its third kiln, will be 60,000 barrels per month, and with the fourth kiln will add another 25,000. The neighboring plant, owned by the Colorado Portland Cement Co., is being overhauled and placed in the pink of condition, so that it will turn out its rated capacity of 3,000 barrels daily, and the two plants will then be capable of more than taking care of the demands which will come to them.

Monarch Cement Co., Humboldt, Kans., is building an addition to its cement storage in the form of six reinforced concrete circular tanks, each 28 feet in diameter by 70 feet high. This structure will provide an additional storage capacity of 50,000 barrels of finished cement. Two No. 85 kominuters will be installed in the raw grinding department and a No. 21 Allis-Chalmers breaker is also being installed in a new reinforced concrete crusher building.

An admission damaging to American pride has come from the United States consul in Colon, Panama. The United States, according to the consul's report enjoyed practically a monopoly of the foreign trade with Panama during the war years but at the present time is rapidly losing ground. Panama prefers to trade with America, but American exporters seem unable to meet the competition of European firms.

An illustration is given in the importations of cement, a commodity used in large quantities. German cement can be loaded into ships at Hamburg, transported all the way across the Atlantic, freight and insurance paid, and delivered on the docks at Colon for $5 a barrel, 20 per cent less than the best prices of American manufacturers. Sales of American cement in Panama are a thing of the past unless producers in this country find a way to meet the German price.—Decatur Journal.

R. P. Butchart, president, and Clark M. Moore, former sales manager of the Oregon Portland Cement Co., Oswego, Ore., were fined $5,000 and $2,500 respectively by Federal Judge Robert S. Bean for violation of the Sherman anti-trust law. Payment of the fine was suspended following appeal of the case to the circuit court of appeals at San Francisco.

The court said: "It seems from the evidence in the case that at the time the Oregon plant was ready to market its product there existed an unlawful agreement between other companies selling in this territory, to fix prices. The evidence shows that the Oregon company also entered into this agreement in order that it might survive and meet competition."

The court then added that violation of the law by others was no defense for Butchart and Moore entering into the conspiracy.

At the same time Butchart and Moore were indicted by the Federal grand jury, the leading officers in other coast cement companies were also indicted. In these cases an agreement was reached whereby the indictments were dismissed and the companies pleaded guilty and were fined $2,500 each.

The companies fined were the Cowell Portland Cement Co., Pacific Portland Cement Co., Santa Cruz Portland Cement Co., and Standard Portland Cement Co., all of San Francisco; Riverside Portland Cement Co., Riverside, Cal., and the Superior Portland Cement Co., Washington Portland Cement Co. and Olympic Portland Cement Co., all of Seattle.

The National Portland Cement Co., Detroit, Mich., has been organized with the following officers: M. B. Robinson, president; H. C. Shields, vice-president and general manager; George A. Kruger, secretary; Howard B. Lee, treasurer. The company, whose capitalization is $2,000,000, succeeds the Robins Portland Cement Holding Co. of Michigan and the Robins Portland Cement Co. of Delaware. It will build a 1,800 barrel plant near Mt. Pleasant, Isabella County, Mich. John A. Acker, formerly general superintendent of the Michigan Portland Cement Co., Chelsea, Mich., has been retained as consulting engineer.

L. L. Griffith, formerly with the Clinchfield Portland Cement Co., has been made general superintendent of the Michigan Portland Cement Co., to succeed J. A. Acker.

The Choctaw Portland Cement Co.'s plant is shut down on account of lack o fbusiness, and has not been operating since November 15, 1920. All the men are laid off except Superintendent J. W. Ditto and George Bushfield, who are looking after the plant.

W. J. Young, chief engineer and general superintendent for the Alpha Portland Cement Co., Easton, Pa., has resigned to accept a position as chief engineer for the Standard Lime and Stone Co. and the Washington Lime Co., of Baltimore, Md. Both of these companies are controlled by the same interests. Mr. Young, who takes up his new duties on April 1, has been with the Alpha company since 1907.

F. J. Adams has been appointed superintendent of the Bonner Portland Cement Co., at Bonner Springs, Kas., to succeed U. S. Hannum, former superintendent, whose resignation was effective April 1.

Howard H. Brewer, Easton, Pa., mechanical engineer at the Martin's Creek plant of the Alpha Portland Cement Co., has been transferred to the company's new plant at Belleview, Mich.

William E. Erdell, B. Nuding, Mrs. William R. Yeager, E. A. Wolfe and H. E. Hess were elected directors of the Penn Allen Cement Co., Allentown, Pa. The following officers were chosen: William E. Erdell, president; E. A. Wolfe, vice-president; H. E. Hess; T. V. Bretherton, secretary.

Radicals are blamed for setting off a bomb at the entrance of the Crescent Portland Cement Company's plant at Wampum, Pa. Considerable damage was done to the plant entrance, and the manager, J. C. Kirk, had a miraculous escape from death.

The Nebraska Cement Co., Superior, Nebr., recently constructed sixty houses and a three-story hotel for their employees. They are double wall concrete houses with a dead air space, having been built economically with forms furnished by Hollow Concrete Wall Company, Mitchell, South Dakota.

Construction work has been delayed on the new plant of the Pyramid Portland Cement Co., Des Moines, Ia., of which E. Struckman is general manager. No definite date for the completion of the plant can now be set.

Gilmore Portland Cement Corporation, Gilmore City, Ia., have installed a Bradley-Hercules mill to grind raw material, which has been producing an average of 40 tons plus per hour to a fineness of 60 per cent through 100 mesh sieve. This mill takes rock 2½ inches and under and reduces for tube mill finishing. The exceptionally fine product derived from the Hercules mill increases the output of the tube mills at least 25 per cent, permitting a better fineness from the tube mills which, in turn, increases the output of the kilns. They have also installed in their coal department Giant Griffin mills.

The Carney Cement Company, manufacturers of brick layers cement, Mankato, Minn., opened its West Mankato plant last week and started six out of the eight kilns in that plant. The management of the company in a recent statement stated that the building prospects for the ensuing year are becoming brighter, and in all probability will continue to grow better as the season advances. The company's new plant at Carney, three miles north of Mankato, is being rapidly brought to completion. When the plant is completed there will be sixteen kilns, and the plant taken as a whole will be one of the largest and best equipped in the northwest.

Much activity and improvement is noted at the plant of the Old Mission Cement Company at San Juan Calif. T. L. Keading, who has just finished the building of tramways to two new quarries that are to be opened at once, has been awarded the contract for the quarrying of the limestone rock, and already has a force of men at work. When the two new quarries are in full operation. Mr. Keading will have about forty-five men on the job.

The tramways are 1,200 feet long and the cars carry their loads down the incline by gravity, the cars having a capacity of eight tons to the trip.

The cement company's railroad has been extended one and a half miles to the ends of the tramways to receive the rock from the tram cars.

Effective April 15, 1921, O. L. Moore, Chief Cement Inspector, Universal Portland Cement Co., has been appointed Engineer, Inspection Bureau with headquarters at Chicago, to have charge of all matters pertaining to Cement Inspection.

News of the Concrete Products Factories

Robert L. Day, architect, 1010 First National Bank Bldg., Huntington, W. Va., will lease a plant site on reasonable basis. A concrete products plant making quality concrete building units and other products will prosper. Co-operation of architect assured. A live man, experienced in the manufacture and sale of quality concrete products will find an excellent opportunity open in Huntington.

Ira B. Barnard has accepted the position of superintendent of Hydraulic Stone & Building Co., of Trinidad, Colo. The plant is a new one and production of reconstructed stone has commenced.

A new factory building of the Wapakoneta Cement Block Co., Wapakoneta, Ohio, is completed.

Harry G. Krum, manager St. Paul Cast Stone Co., St. Paul, Minn., was re-elected president Minnesota Concrete Products Association. In his speech of acceptance Mr. Krum said, "Concrete men must advertise. We are selling concrete blocks in St. Paul 75 to 100 per cent cheaper than Duluth, and Duluth buyers never knew it."

W. J. Barnhart, Guthrie, Okla., is in the market for a mixer, roofing tile machine and tile molds.

The Saukville Cement Tile Co., Saukville, Wis., have for sale a cement drain tile plant in fine running order. Plenty of orders for entire year.

The Nustone Products Corp., 505 West 23d street, Baltimore, Md., has leased 10,000 square feet in building to manufacture concrete laundry tubs; annual output 10,000.

Thos. U. Stafford, general contractor, Iron Mountain, Mich., has purchased machinery and expects to have his plant in operation by April 25. It will have a daily capacity of 15,000 concrete bricks and 6,500 concrete blocks. The factory will be electrically operated. He has purchased an Anchor block machine and tamper and a Dunn No. 9 mixer. Not decided on brick machine. Wants prices an dcatalogs on roofing tile machine, sewer pipe molds and transfer cars.

The most interesting feature of the new No. 2½ motor drive Kent mixer (a labor saving machine built especially for concrete products factories), which the Kent Machine Co. of Kent, O., has recently placed in the market is the type of drive used. The mixer has a capacity of 8 cu. yds. of mixed concrete per hour, and is equipped with 5 h. p. motor. Motor is placed at the rear on the left side of the machine with the base in a vertical plane bolted securely to a heavy gray iron casting which is in turn bolted between the 5½-in. channels. This method gives a rigid support to the motor, saves considerable space and makes a very compact and convenient machine.

The most important feature of a concrete block is its strength. To attempt to make or market a block of insufficient strength for the purpose for which it is intended, will not only result in ultimate disaster to the maker, but it is detrimental to the entire concrete block industry. The manufacturer of a thoroughly strong block of neat appearance, sold at a fair price, will be in business long after the unscrupulous manufacturer has dropped out of the race.

The concrete block intended for general use should be so made that it will withstand a pressure of 1,500 pounds per square inch of net cross sectional area, and will not absorb to exceed 8 per cent of its weight in moisture. Under certain conditions, specifications may be even more severe; and while under some conditions a weaker block would be perfectly safe, a high factor of safety should be considered and maintained.

The second element of importance in the concrete block is its appearance. In richness of appearance, as well as endurance, no style of block can surpass the plain granite-faced type, if properly treated and cured.

Very pleasing effects can be produced by using aggregates containing granite, marble chips, white sand, mica spar crystals, quartz or colored sands. Concrete block also make a very satisfactory surface for the application of stucco, on account of their low absorption and equal expansion.

Care should be taken to see that the blocks are deposited in the wall with their sharp corners intact, thus insuring a uniform mortar joint.

The plant of the Shope Concrete Brick Company at East Eighth and Division Streets, Portland, Ore., is being enlarged and will cover the entire block.

As an indication what the company is doing here is a partial list of new buildings in Portland, Ore., in which Shope concrete brick is specified.

Montgomery Ward & Co., 1,250,000 of face brick; Leadbetter Building, Tenth and Stark; Wilson Building, Fourteenth and Morrison, to be occupied by McCracken Motor Car Co.; Simon Building, two stories, at Second and Taylor; Sellwood Transfer Garage, East Thirteenth and Umatilla; Hall & Knighton Garage, Milwaukie and Bysbee; Ball Garage, East Fifty-third and Stark; Searle Garage, East Seventy-sixth and Glisan; City Garage, built by Elks' Lodge at Twelfth and Alder Streets.

Demand for the Shope brick making machines also is expanding, a recent order coming from Casper, Wyo. Five of the machines were shipped to Casper by express, and a new plant has recently been completed in Milwaukee for the manufacture of Shope process concrete bricks.

The energies of the company have been centered on producing a perfect concrete brick, waterproof and free from discoloration. The brick has a forty-ton crushing resistance of 3,000 pounds to the square inch, giving a saving factor of nine times the carrying load in a building three stories high.

Crown Point Spar Co., 663 Broadway, New York City, are producers of Mica Spar Crystals. This product has gained such a wide popularity as a facing aggregate that concrete products manufacturers should make a careful study of its merits. The future of concrete block depends upon surface treatment and the matter of facing structural units attractively or covering a plain wall with stucco is worthy of careful consideration. Micaspar has a two-way cleavage and

Important Announcement

Now—*All* Du Pont Dynamite is practically *Freeze-Proof**

Result of continuous research toward improvement of product

THE first commercial "low-freezing" dynamite was produced by the Du Pont Company, which has since developed a large number of similar explosives. Now a new step forward is taken. The following is an excerpt from Bulletin No. 26 to Du Pont Salesmen:

> **"We have requested the Operating Department to discontinue the manufacture of high-freezing straight dynamite and to make all strengths of Du Pont Straight on the new low-freezing formula. Field tests with this low-freezing straight indicate that it is fully the equal of our high-freezing straight in strength and that it will stand up as well in cold weather as our Du Pont Gelatin, or Red Cross Extra grades. Recent field examination showed that it remained plastic at ten degrees below zero... The low-freezing straight will give satisfaction at freezing and lower temperatures..."**

In the Du Pont Laboratories chemical and ballistic engineers are constantly searching new methods for making Du Pont Explosives more efficient, more economical and more perfectly suited to the needs of industry.

This last remarkable advance in the art of explosive manufacture is merely an example of the work of these men, which results in month-to-month, almost day-to-day, increase in the efficiency of Du Pont Explosives—for as soon as an improvement has been thoroughly proven out, it is immediately adopted in all Du Pont plants.

Such work as this—constantly meeting, even anticipating, industry's requirements—surely comes under the head of Du Pont Explosives Service.

E. I. du Pont de Nemours & Co., Inc.
Sales Department: **Explosives Division**
Wilmington, Delaware

Birmingham, Ala.	Chicago, Ill.	Joplin, Mo.	Pittsburgh, Pa.	Scranton, Pa.	
Boston, Mass.	Denver Colo.	Juneau, Alaska	Portland, Ore.	Seattle, Wash.	*Du Pont Products Exhibit*
Buffalo, N. Y.	Duluth, Minn.	Kansas City, Mo.	St. Louis, Mo.	Spokane, Wash.	Atlantic City, N. J.
	Huntington, W. Va.	New York, N. Y.	San Francisco, Cal.	Springfield, Ill.	

*Except certain Permissible Explosives and Blasting Gelatin.

EXPLOSIVES ~ SERVICE

breaks up in irregular and cubical crystals, thus enabling them to fit closely together when reassembled into stone to make a dense mass. Machinery used for crushing limestone and ordinary marble is not of sufficient strength to break micaspar rock. Hence micaspar has no smooth or round pieces. Micaspar after a 24-hour immersion test absorbs but 1/700 of its weight. Limestone absorbs 1/38 of its weight and ordinary marble 1/300. Write for the new booklet entitled "Micaspar—How to Use It."

At a recent meeting of the American Concrete Pipe Association, recently held in Chicago, A. N. Sherwin the president said:

"This meeting is to promote the development of concrete manufacturing, and to urge the use of concrete pipe for sewers, culverts, irrigation ditches, water supply lines and drainage.

"The prospects of the year are most encouraging. In our business we have not felt the prevalent depression and, personally, my business has never been as great in the same period before. With the expected increase in road building, with the steadily increasing uses for concrete pipe, and with the help of a well organized national body such as the American Concrete Pipe Association, there is every indication that the year's business will not be less than any heretofore."

Resolutions were presented suggesting a greater standardization in concrete pipe design among the trade. Plans are being made by the association to start a publicity campaign on behalf of the concrete industry, to educate the public up to the need of concrete and its numerous uses.

Fred E. Cook, Box 67, New Harmony, Ind., builds silos, using Polk System forms. Operates Burrell block machine, U. S. Standard and Republic mixers. Is in the market for a new block machine and molds for building 8 feet round culverts and for finished concrete floor tile.

Bennett Barnes Co., Terre Haute, Ind., specializes in concrete piazzas and building blocks. They operate Pettyjohn block machines, Ideal porch column, sill and cap molds. Use Ottawa Silica Co.'s white sand for facing.

Oneida Double Wall Co., 11 Lexington Ave., Oneida, N. Y., operate Van Guilder wall molds for building houses, silos, etc., and a Jaeger mixer. Use Mica Spar Crystals for facing walls. Interested in fence post molds, marble chips and waterproofing compound.

Ridgeville Concrete Works, Thos. W. Bishop, prop., Ridgeville, Ont., Canada, operates Ideal block and tamper, Sawyer sewer pipe molds, London brick machine and mixer and Dunn drain tile machine, vase and chimney block molds. Interested in waterproofing and facing materials.

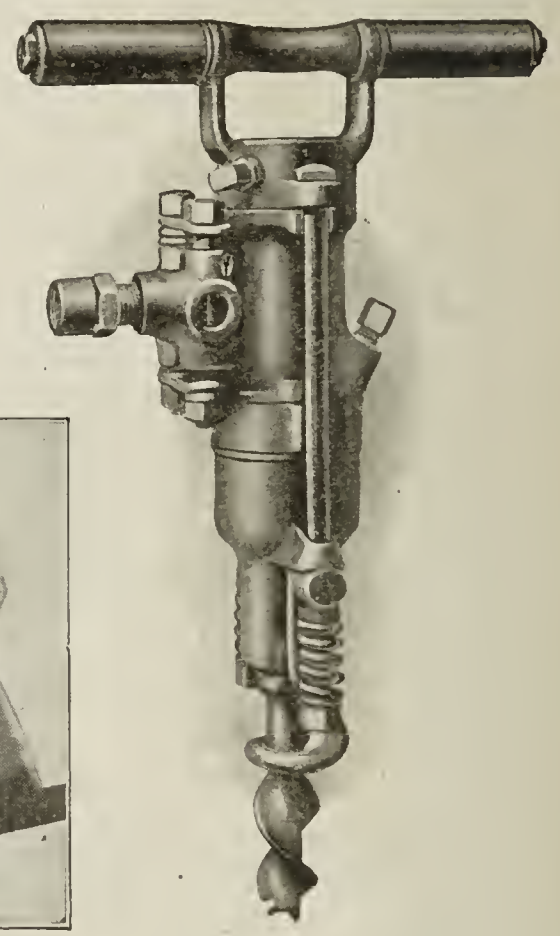
Wright Brick Co., Arkadelphia, Ark., operates a Peerless brick machine and a Kent continuous mixer.

Peru Cement Products Co., A. J. Bruck & Son, proprietors, Peru, Ind., operates Hobb block, Peerless brick, Kramer tamper and a Kent continuous mixer. Face their blocks with mica spar crystals. Interested in silo molds, roofing tile, burial vaults, vases, drain tile, porch columns, septic tanks, fence posts, flower boxes, molds and waterproofing compound.

Dependable Drills for Rock Quarrying

The Sullivan Rotator, shown herewith, may fairly claim to be an "all around" rock drilling machine. Since its introduction, a few years ago, as an improved type of hammer drill, its use has rapidly extended to nearly all kinds of rock drilling work, including block holing and cutting hitches; shaft sinking, and a great variety of down hole drilling; drifting, stopping, and even light tunneling; work in hard and soft rock, ore and coal, in quarries and mines, in road grading, in sewer trenches and in heavy open cut work. The Rotator is a "one-man" hammer drill in the fullest sense, weighing 29 to 40 pounds. It is equipped with automatic steel rotation, is built in separate air and steam types, and may be used as a hand tool or on a mounting. Rotators drill holes from eight to twelve feet deep for 1¼-inch powder, and are available in several models, to suit varying conditions.

Sullivan Drills have been leaders in educating the rock drilling public to the advantages of greater cut-



ting speed, of reduced weight, and of increased power economy. The "one-man" piston drill for mining, the light "plug" drill for granite quarries, the air feed stopper, the air-jet sinker and the Rotator itself, all have marked important steps in the progress of rock drilling efficiency. While the "Rotator" in its present form was placed on the market about seven years ago, a Sullivan Hammer Drill with automatic bit rotation was used in the Vermont granite quarries as early as 1906.

Sullivan "Auger" and Lightweight Rotators, Sullivan Mounted Water Hammer Drills, for drifting and heavy mining work, Sullivan Stopers, Plug Drills, and Hyspeed and Liteweight Piston Drills are described in bulletins, which will be mailed upon request. Write the Sullivan Machinery Co., 418 Peoples Gas Bldg., Chicago.

A BIG DEMAND FOR THESE VAULTS
—PROFITS LARGE—

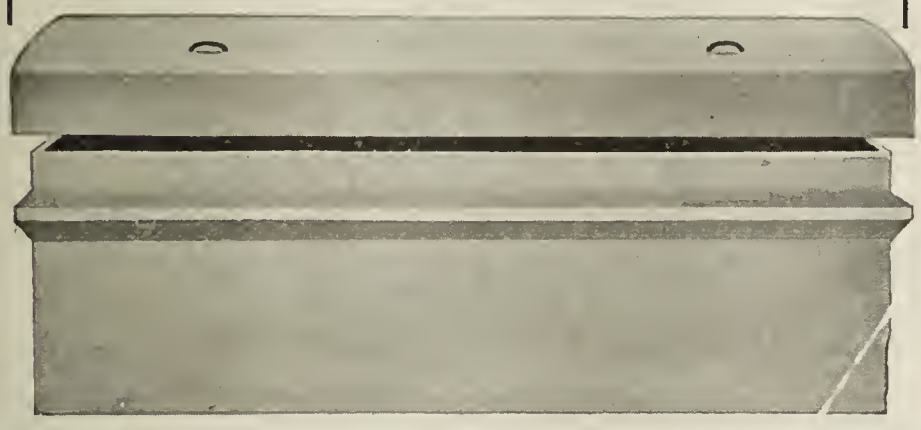
With our Adjustable Steel Molds you can easily make any size of the Automatic Sealing Burial Vault at an exceedingly low total cost.

When once they are seen and used in a community the Automatic Sealing Burial Vaults come into instant demand. They are far superior in every way to any other cement or steel vaults.

The manufacturing of these Automatic Sealing Burial Vaults with our Adjustable Steel Molds is a big money making opportunity. The first ten vaults you sell will more than pay back your entire investment—materials, molds, time, etc., etc.

Write us for complete particulars.

Automatic Sealing Vault Co.
216 E. River St. PERU, IND.



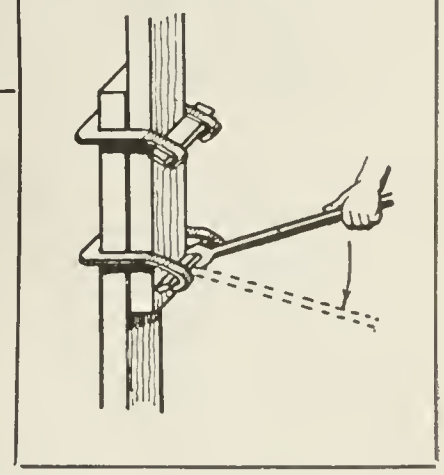
Are You a Contractor?

If you are, you will want to look further into the economy of the Schenk Patented Timber Clamp for shores. No nails are used—nor boards sawed to any required length.

Labor and loss of material are saved — important items on any job. The clamps are placed in a moment's time, and will support the heaviest pressure.

Write for our catalogs.

The **Schenk Timber Clamp**



Schenk's Patented Timber Clamp., Co., Ltd.
2292 Larned St. East
DETROIT

AGENTS WANTED
THROUGHOUT
THE U. S.

THE HELM PRESS

has contributed to the building industry the greatest advance toward a perfect, permanent brick and block. Every part of it has culminated from mature experience and is based on sound engineering principles. The Helm press is always built upon the basis of ultimate satisfaction to the user. No pains are spared to use the best materials obtainable and the best workmanship in putting them together.

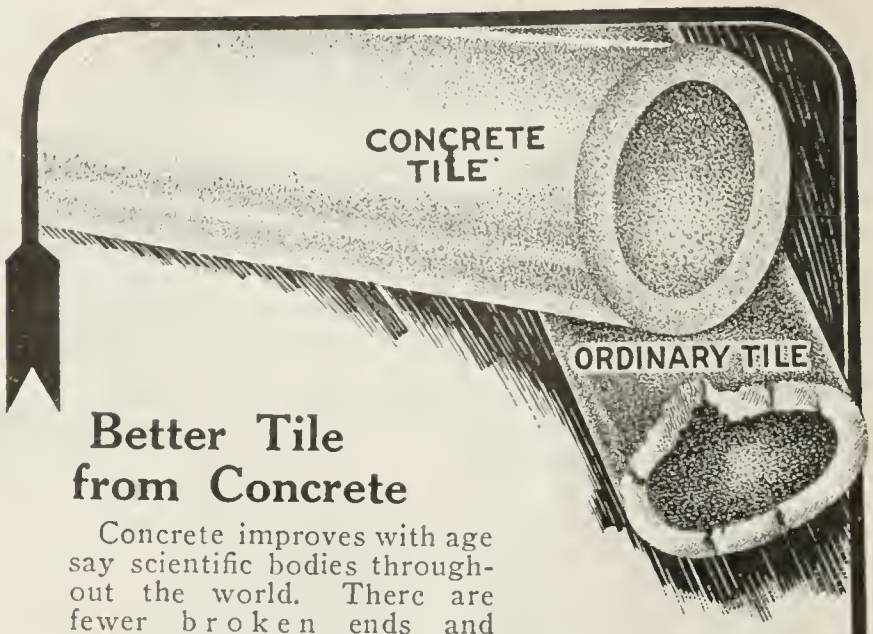
That is why hundreds of satisfied users employ the Helm press to make their bricks and blocks and why a large percentage of our business is repeat orders.

Helm supplies everything necessary for the complete concrete brick and block factory—plans and installs it—then stands solely responsible for its satisfactory operations. If you are considering installing a new brick or block plant, or changing your present equipment, you are invited to write us—it obligates you not at all and you can't go wrong.

THE PRESS THAT MAKES THE MONEY

THE HELM BRICK MACHINE CO.

764 MITCHELL STREET CADILLAC, MICH.



Better Tile from Concrete

Concrete improves with age say scientific bodies throughout the world. There are fewer broken ends and cracked tiles, when they are made from concrete. They lay up closer, and make a better job, because they are more uniform in shape and size.

Tamping Method Superior

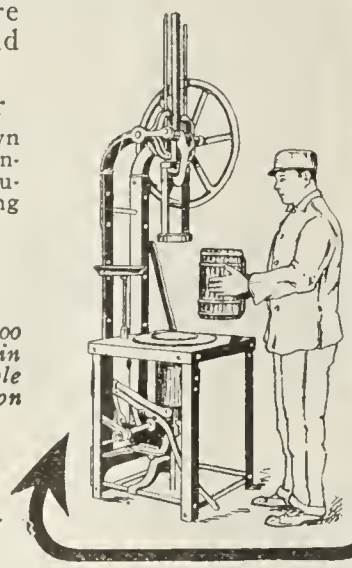
The Bureau of Standard has shown that the tamping method, that principle employed in the Cardiff, is superior to the rotary or pressing method of moulding.

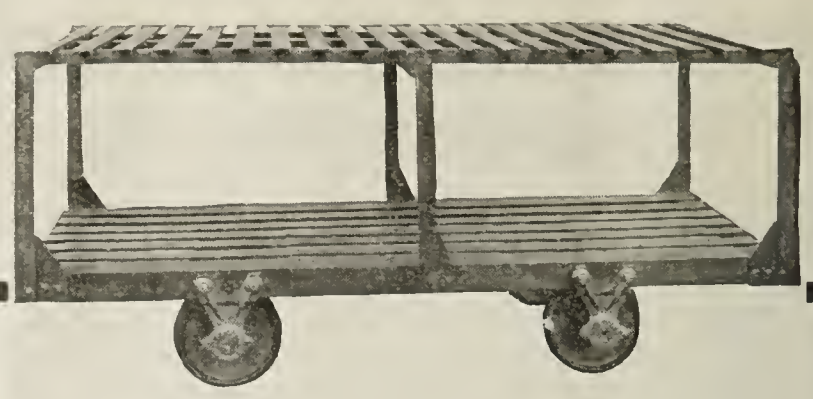
Cardiff Cement Tile Machine

will make its owner from $50 to $100 per week. Cement tile, moulded in a Cardiff Machine make a profitable side line for anyone in a position to follow it.

Write for full description and proofs.

Leavitt Manufacturing Company
370 Griggs St., Urbana, Ill.





Conco Cars are distinctly "Quality" cars—specifically built to produce a degree of efficiency and dependability that will keep operating and maintenance expenses down to a minimum. All that superior workmanship, the very best of materials, and the careful inspection of materials and castings can contribute to this end, is utilized in the modern and finely equipped Conco factory.

They meet a long felt want among concrete products manufacturers and are moderate in price.

H. D. CONKEY & CO.

MENDOTA ILLINOIS

PULLEYS, GEARS, HOISTS

Hyatt Roller Bearings in Stock

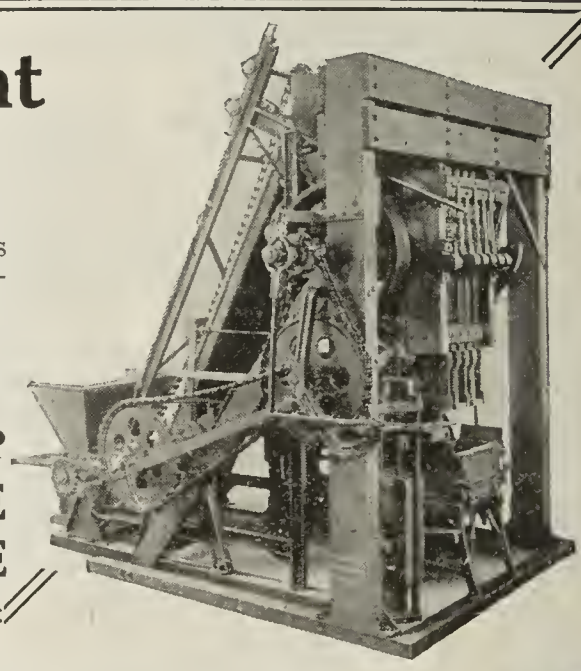
Add our new Automatic Equipment to your present outfit

and the efficiency of your "plant" will be increased many fold. Twenty-three motions will be reduced to one—a high-grade block made in 12 seconds. Ready for delivery—write today for Catalog 35.

Limited territory in South and West. Dealers write without delay.

THE IDEAL CONCRETE MACHINERY CO.

1318 Monmouth Street Cincinnati, Ohio



New Ideal Automatic CONCRETE BLOCK MACHINE

SAVE CEMENT

Salvage from 5 to 10 sacks of good cement from each 1,000 empty sacks and reduce labor by one-half—by cleaning them in our Unit Sack Cleaner

Write us for particulars.

Handy Sack Baler Co.
620 S. 2d St.,
Cedar Rapids, Iowa

SELECTED WHITE SAND

UNEXCELLED FOR

Facing Concrete Blocks, Ornamental Concrete Stone, Hard Plaster, Finishing, Exterior Plastering, Roofing, Stone and Marble Sawing, etc.

Prices, Freight Rates and Samples on Application
Shipped in Paper Lined Box Cars
Small Shipments in 175-lb. Bags

Ottawa Silica Company
OTTAWA, ILLINOIS

SAND PUMPS

That pay the largest dividends per dollar of investment.

"The Pump That Makes The Money."

This Pump is all that is implied in the name

LIGHTNING

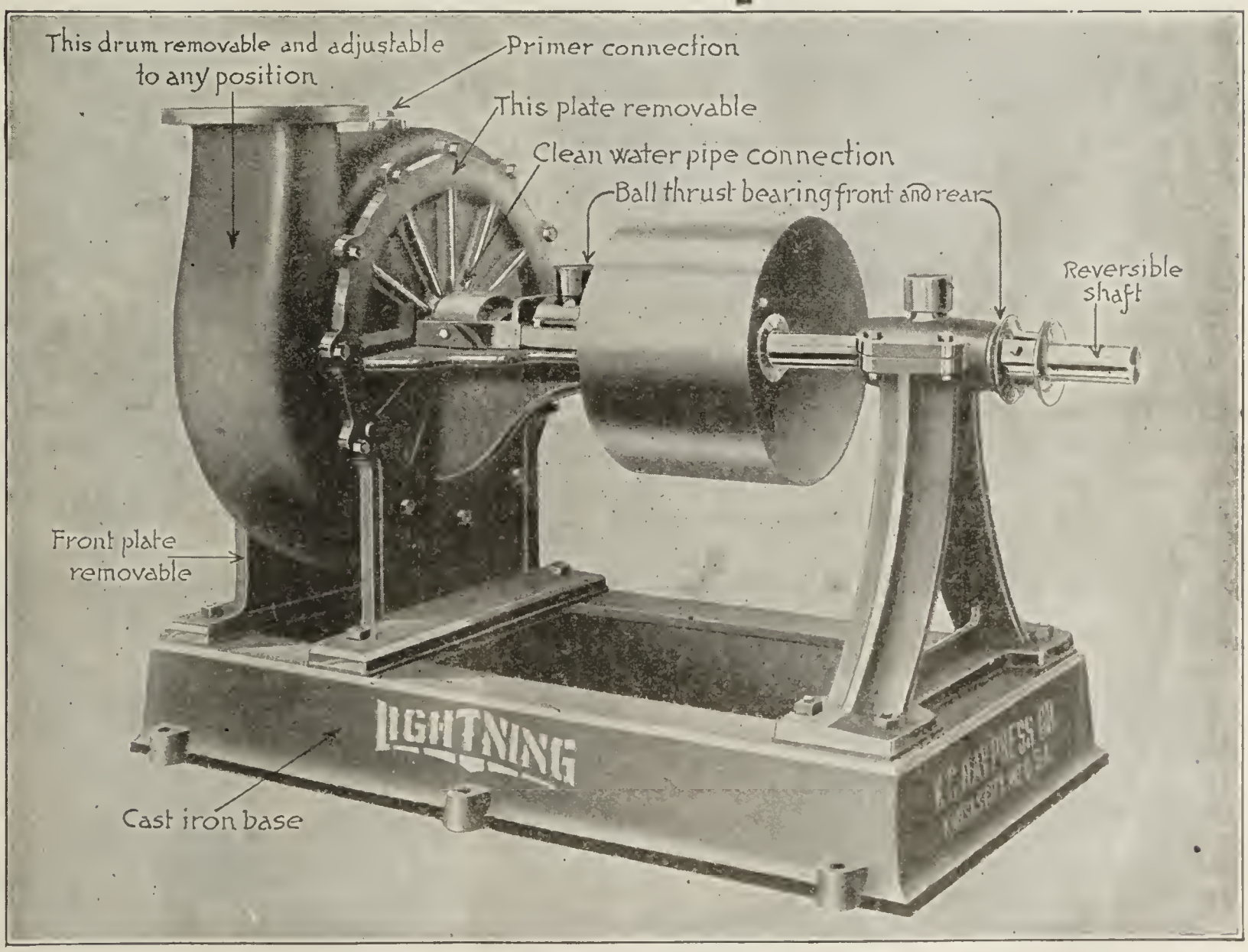
Its rugged construction and Simple operation assures maximum efficiency in operation at all times.

It is easy to adjust and easy to replace parts. Thousands in successful operation are striking endorsement of their dependability.

KANSAS CITY HAY PRESS & TRACTOR COMPANY

KANSAS CITY, MISSOURI

THE PUMP OF SIMPLICITY AND STRENGTH



AJAX CONVEYOR BELTING

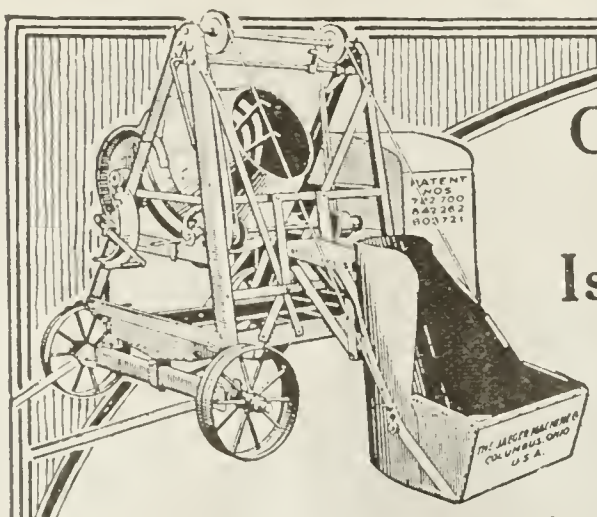
IN the Ajax Brand Rubber Conveyor Belting we offer a first class belt for ordinary conveying purposes. The duck and rubber is of good quality and will compare favorably with the good belts now on the market. We make it with a flat or convex surface, and with a cover varying in thickness from one-sixteenth inch to one-fourth inch. For conveying coal, sand, gravel, stone, etc.

Advise us regarding your installations. We make belts for every purpose.

Conveyor Belts *Transmission Belts* *Packing*
Elevator Belts *Hose—all Kinds* *Valves, etc.*

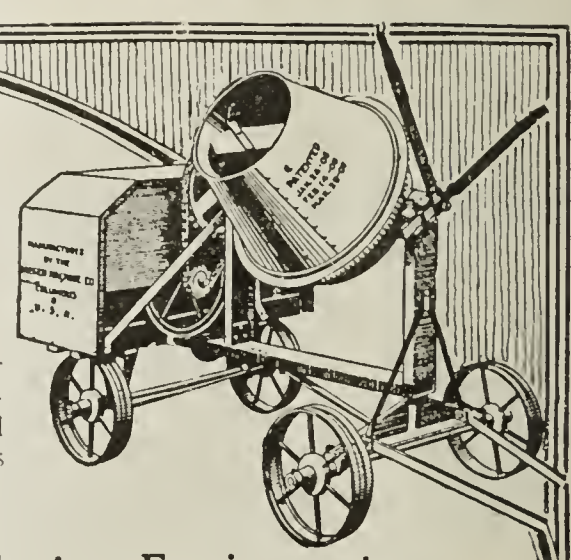
The Gutta Percha & Rubber Mfg. Co.
301 West Randolph Street
Chicago, Ills.

New York Boston Seattle
San Francisco



One Thing Is Certain
THE JAEGER
Is a Bear for Speed

Outfitted with Jaeger mixers and Jaeger Placing Equipment you have the time-saving, labor-saving aids that cut cost and land the better jobs and the bigger profits for you.



A Mixer for Every Job

With three sizes of batch capacities—with fourteen different outfits. No matter what kind of concrete work you have, there is a Jaeger Mixer for you. Each Jaeger Mixer is famous for being efficient, economical, strong, durable, and low in first cost.

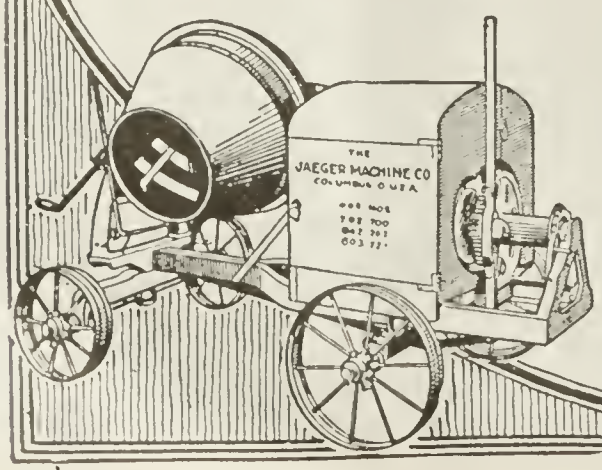
We guarantee the Jaeger Mixers to be constructed of the best material in the best mechanical manner.

Jaeger Placing Equipment

consists of the Jaeger Mixer complete with loader and hoist. Spouting outfit consists of 50 feet of track and 10 foot sections, and adjustable legs. Skip car holds one full batch of concrete and is automatic in dumping and equipped with brakes. The hoist pulls this car up to hopper where it dumps.

Full information and prices mailed on request.

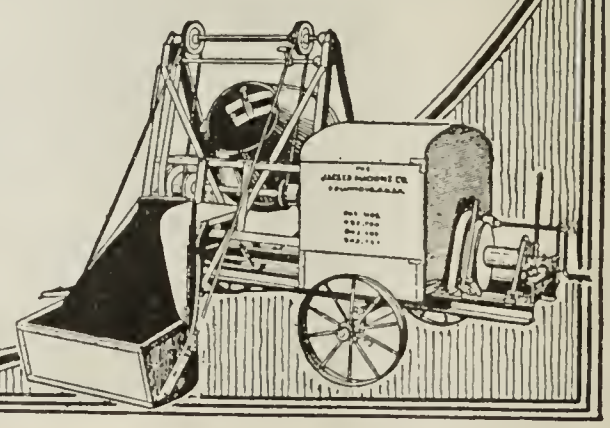
THE JAEGER MACHINE COMPANY **212 Dublin St., Columbus, Ohio**



Quality

MIX A MINUTE

Mixers



HEADQUARTERS FOR CONCRETE MACHINERY

Money Making
Block Machines
Brick Machines
Concrete Mixers
Block Molds
Ornamental Molds
Drain Tile Molds
Sewer Pipe Molds
Fence Post Molds
Etc., Etc.

Write for Catalog

Concrete Equipment Company
540 Ottawa Street
HOLLAND, MICHIGAN

"Perfect" Concrete Block Power Machine

C. S. WERT Inventor and Patentee

Built entirely of steel and iron.
Turns out, with four men, 1,000 to 1,200 concrete blocks in ten hours.

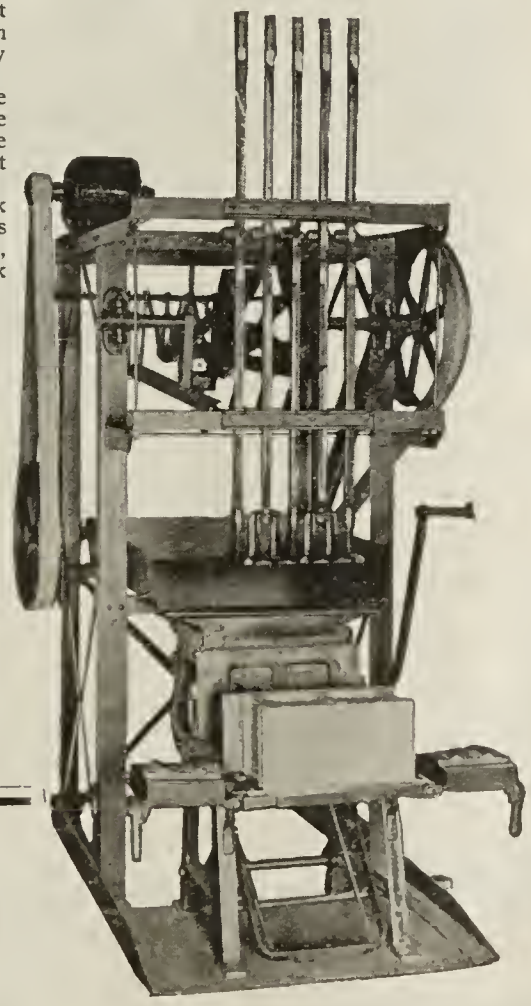
In severe tests, Perfect Concrete Brick have proven stronger than common clay and pressed clay brick.

The power tamper may be operated by a one horse power motor, a 2½ horse power gas engine or direct from a line shaft.

"There is no better brick machine manufactured," says W. T. Sharp, of Montana, owner of a Perfect brick plant.

Get facts and figures now. Write while the matter is on your mind.

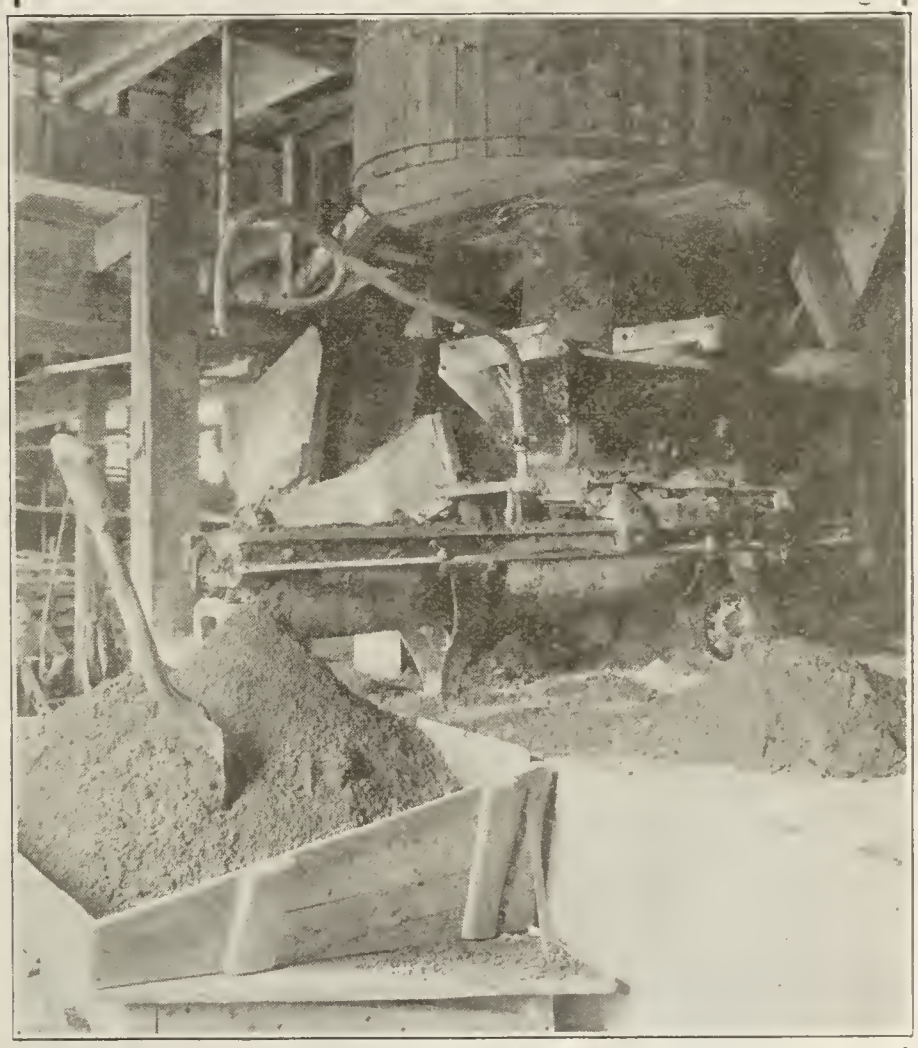
Also Hand and Power Brick Machines
Hand Brick Machines
Well, Cistern and Silo Molds



Manufactured by
The Wert Manufacturing Co.
547 Railway Exchange Bldg.,
Chicago

THE KENT MIXER
HELPS TO
ESTABLISH RECORD

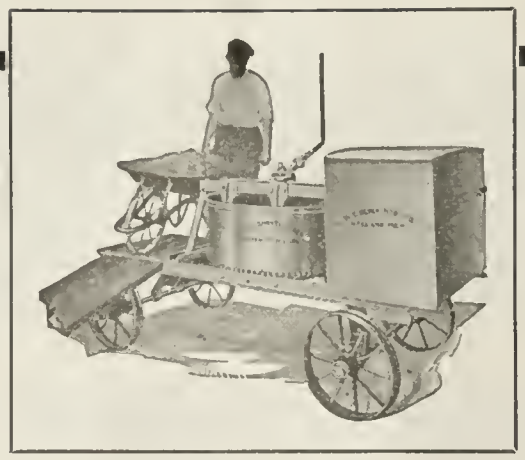
In the plant of the Michigan Silo Co., Kalamazoo, Mich. (shown below) for quality and quantity output in 1920. The Labor Saving Kent Mixer was the dominating mechanical factor.



All guess work and mistakes of careless labor is eliminated in the Kent Mixer by automatic force feed proportioning device which accurately proportions the materials whether wet or dry. The Kent Continuous Mixers have proven their reliability in Concrete Products plants and are approved by leading contractors and concrete product manufacturers.

Write for catalogs.

KENT MACHINE CO.
KENT, OHIO



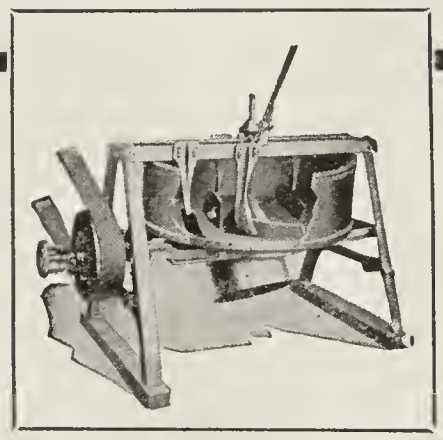
An all-round mixer for all-the-year-round work., Use it on all your concrete, mortar and plaster mixing jobs.

CONTRACTORS USE THIS MIXER ON THREE TIMES AS MANY JOBS

Portable Dunn Shovel Mixers are designed to mix mortar and plaster as well as concrete. They are built to do this work better than you ever had it done before. We want you to expect more service from it than from any other mixer. Don't be afraid of overworking it; keep it busy day after day on all of your mixing jobs. Even if you give it three times as much work to do as you would an ordinary mixer, it won't wear out any sooner.

You'll like the ease by which this mixer is charged, its rapid and convenient bottom discharge, the way it cleans itself, its compactness, portability, sturdiness and dependability. Because it will mix concrete, mortar and plaster and because of its many features, you really get three mixers for the price of one. And you pay no more for it than for an ordinary mixer. Try it out for a couple of weeks before you buy.

Ask Us to Send You Bulletin T-20



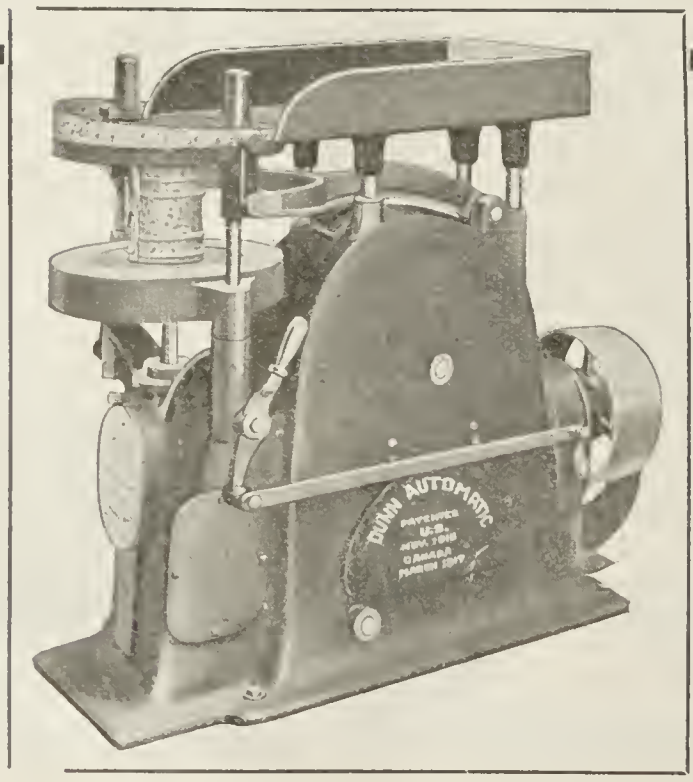
The Dunn Shovel Mixer produces a thoroughly mixed, plastic material because of its four shovels. A hundred times a minute the material is shoveled, stirred and troweled.

It not only saves the labor of one man, but it improves the quality of your products and increases your production. You may try it out before buying.

RUN YOUR PRODUCTS PLANT WITH ONE MAN LESS

With a stationary Dunn Shovel Mixer properly installed you can improve the quality of your products and increase your production with one man less than you are now employing. Simply because power and gravity are utilized to accomplish automatically what you are now doing by hand. The only labor involved in keeping your production machines, whatever they might be, constantly supplied with material is in loading a bucket below the floor level with the unmixed materials.

You'll be interested in knowing that the cost of this complete mixing and conveying equipment is less than that of the ordinary conveyor alone.



Write for Bulletin M-21

THE BUSINESS OF MAKING HOLLOW TILE

The immense demand and market for a more economical, more permanent building unit, such as hollow concrete tile, is readily evident in every community. Supplying this market means a permanent business bringing in large earnings.

It is a big part of our business to completely equip standardized plants for turning out this hollow tile and other products in large quantities at low cost. That we are able to establish you in a most profitable business is demonstrated by the success enjoyed by all Dunn Plant owners.

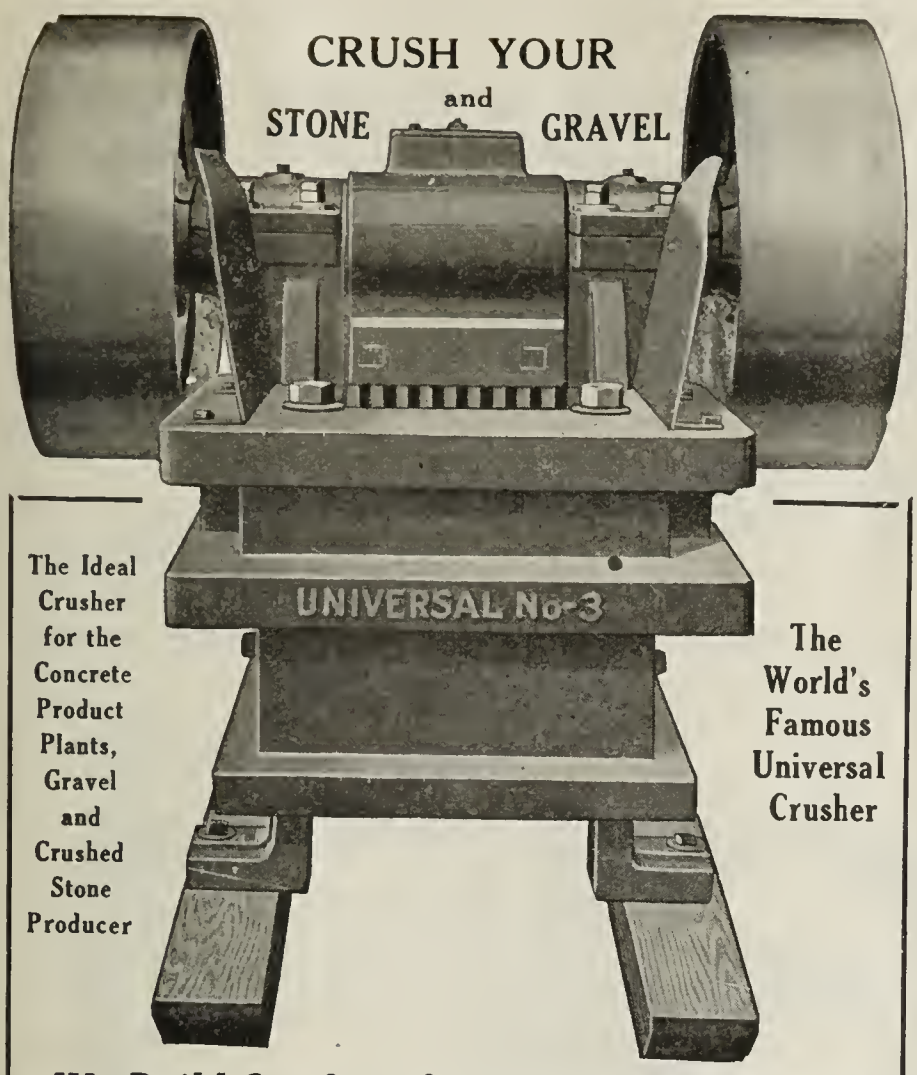
There's a whole lot to be said about this proposition which will interest you. Drop us a line for particulars.

W. E. DUNN MFG. CO.

414 W. 24th Street

HOLLAND MICHIGAN

CRUSH YOUR STONE and GRAVEL



The Ideal Crusher for the Concrete Product Plants, Gravel and Crushed Stone Producer

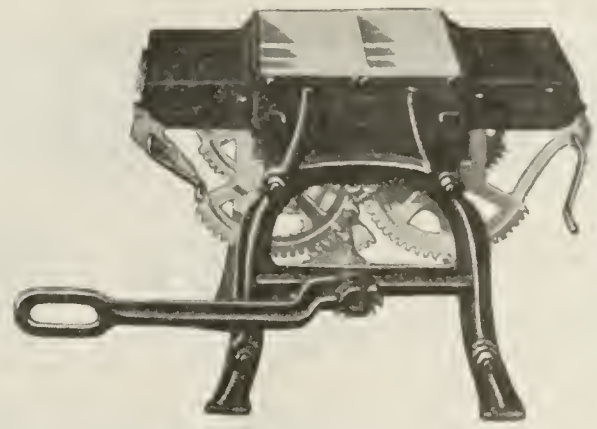
The World's Famous Universal Crusher

We Build Crushers from 5 Tons to 300 Tons per 10-hour Capacity

Instantly adjusted to produce size required from ¼ inch to 3 inches. *Write for Folder No.* 14.

UNIVERSAL CRUSHER COMPANY

230 Bee Ave. Cedar Rapids, Iowa, U. S. A.



Double your daily output with

DOUBLE-SPEED

Brick and Block Machines

Now is the time to increase the capacity of your block plant—turn out the maximum number of wall feet per day, while the demand for building materials is at its highest.

Block Output

Our Double-Speed Block Machine makes in each operation: 2 hollow blocks, 2 silo blocks, 2 solid blocks, 2 slabs, 4 half blocks, 2 water table slabs, 2 return ends, 2 chimney blocks, or 2 porch pier blocks.

Brick Output

Double-Speed Brick Machine makes 16 brick at each operation, 8 brick being delivered at each side of the machine.

Double Speed Tamper

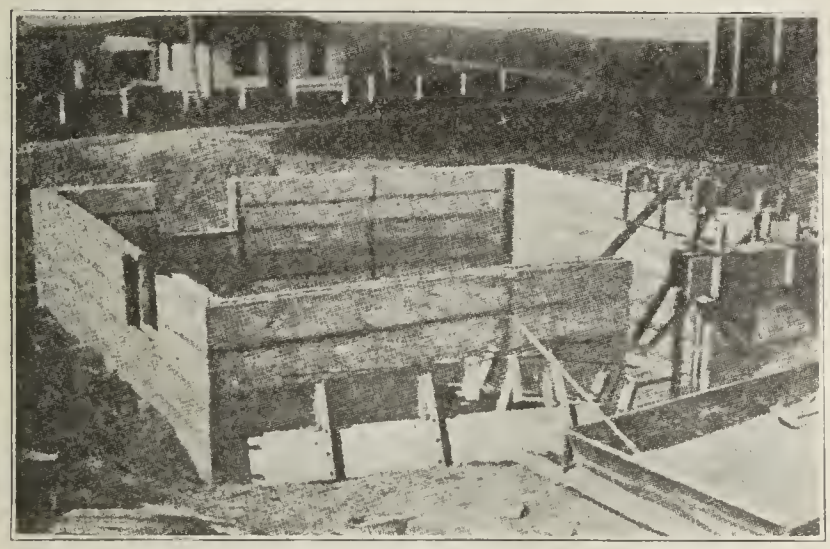
This power tamper gives our block machine a capacity of 1,500 blocks per day and speeds the brick machine up to 15,000 brick per day. Roller-cut-off removes surplus material from mold box and finishes the top of the product. The block and brick are tamped rapidly and vigorously, resulting in a dense, strong product. Machine consumes little power and is practically fool-proof.

Write for block and brick machinery catalog, Dept. A,

Wood Bros. Thresher Co. Des Moines, Ia.

FROST HOLLOW WALL FORMS

ADJUSTABLE TO ANY KIND OR SIZE OF BUILDING



With our forms you can build a double wall, reinforced concrete building to compete with the cost of frame construction.

Moisture-proof, fire-proof, repair-proof walls. Save paint, lath, time and labor to you. Save repair, fuel and insurance to the owner.

Forms adaptable to any size building, adjustable to any thickness wall. Built of poured concrete, reinforced three ways with continuous dead air space makes the most desirable method of building construction. Simple to use, easily adjustable. No skilled labor required. Method has been tried and proven.

Write for complete description of method and its operation, photos showing work done, and costs.

HOLLOW CONCRETE WALL CO.

H. T. FROST, PRESIDENT MITCHELL, SOUTH DAKOTA

MARBLE CHIPS

At Wholesale

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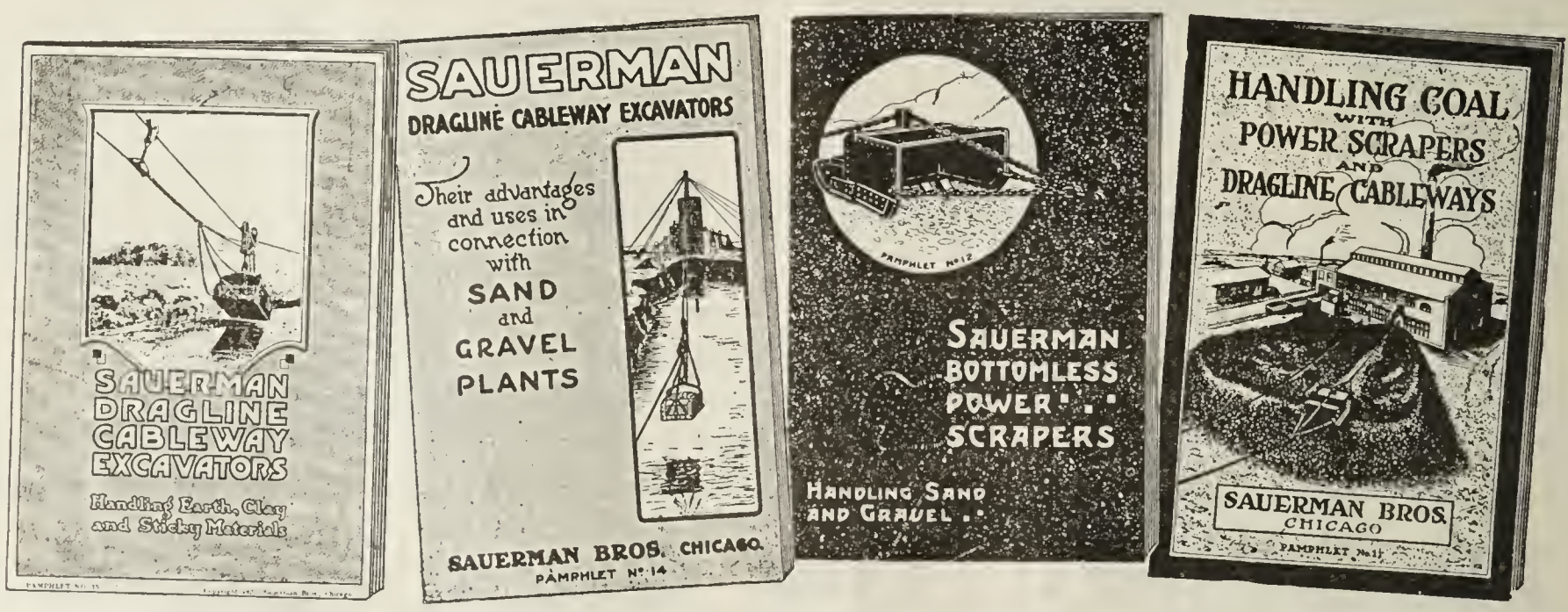

Pamphlet No. 15 gives details of the various types of dragline cableway excavator installations suitable for general dirt-moving operations, brick and tile plants, and so forth.

Pamphlet No. 14 is a handy compilation of data on the dragline cableway excavator method of excavating and conveying sand and gravel, illustrated with many views of typical installations.

Pamphlet No. 12 describes the latest developments in the use of mechanical drag scrapers for handling gravel from hillside, and explains the adaptability of power scrapers for small pits.

Pamphlet No. 11 illustrates practical solutions of various storage problems by use of scrapers and dragline cableways, some of this information being now published for the first time.

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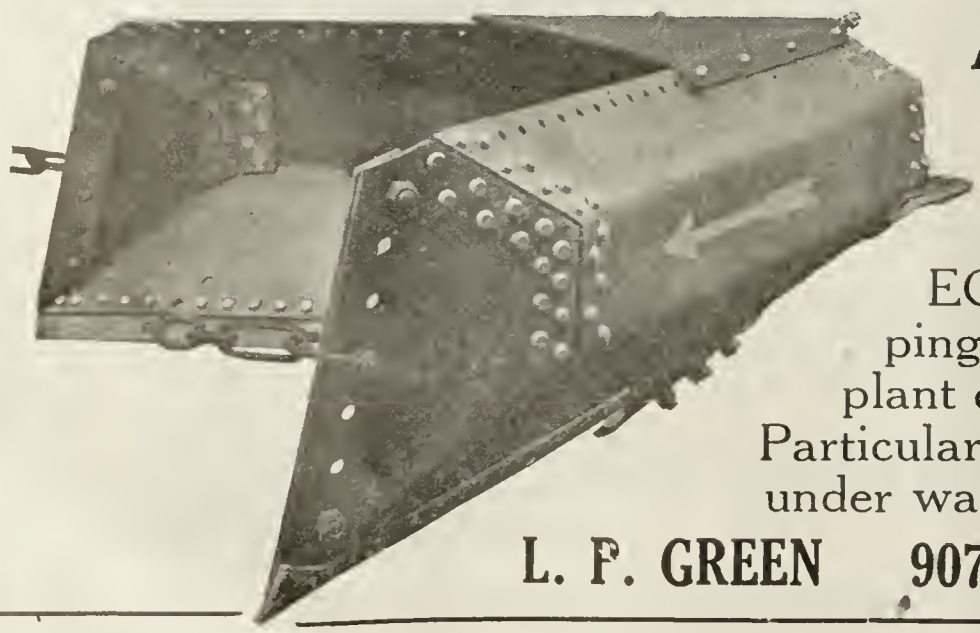

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Operated by two drum hoist. It will do excavating work of all kinds ECONOMICALLY. Grading—Stripping—Delivery of material from pit to plant or bins or for wagon or truck loading. Particularly adapted to hillside deposits or under water. Write for catalog.

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Our circular explains the difference between the poured and dry tamped concrete products.

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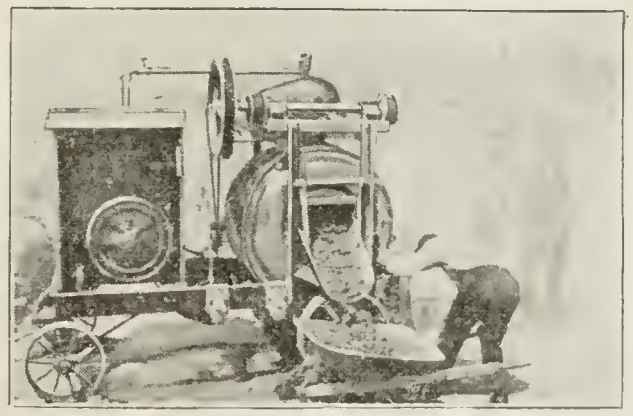

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Its dependability and simplicity commends it to the contractor who appreciates the importance of uninterrupted service.

The Atlas is made in various sizes and styles. Let us mail you our catalogue.

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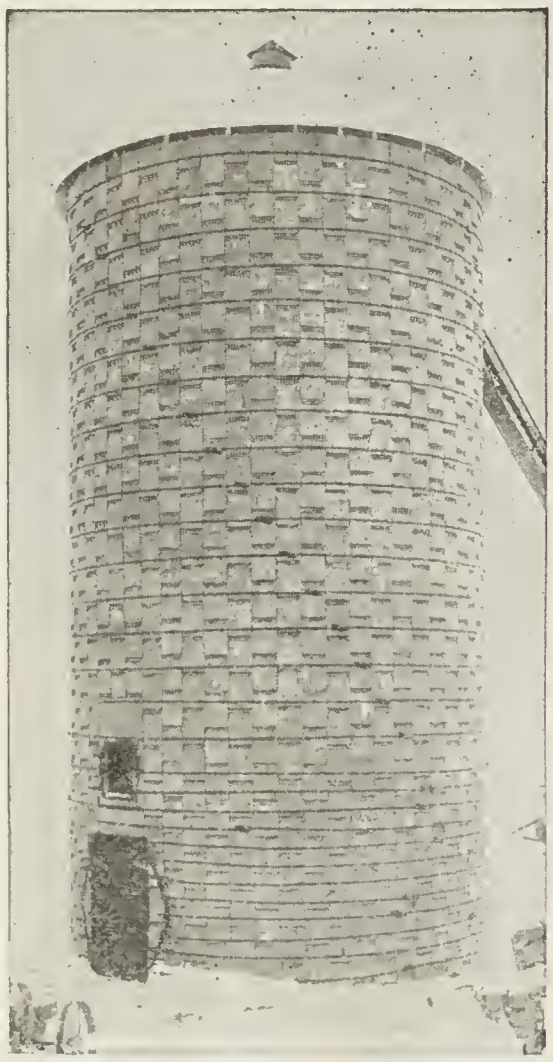

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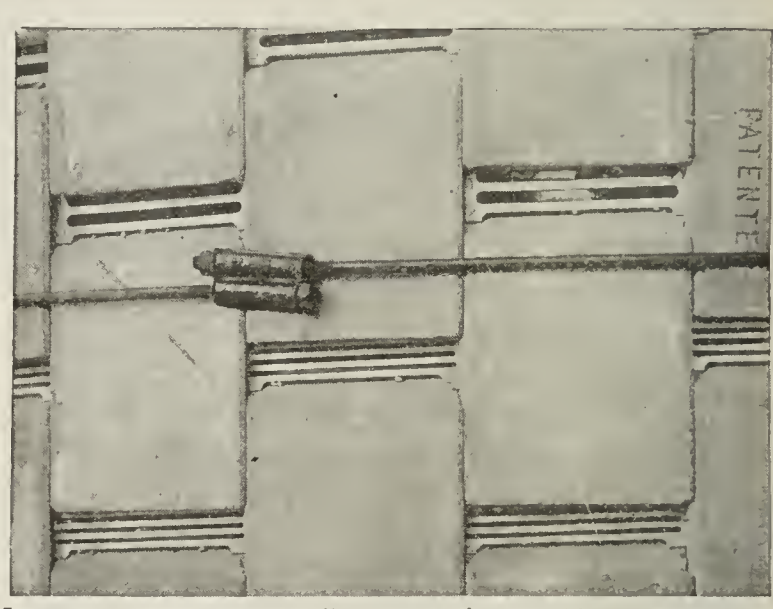
Gives every rural contractor an opportunity to take advantage of the large demand for better Corn Cribs. Every farmer is a prospect for a concrete crib.

THE IREY PATENTED VENTILATED CONCRETE STAVE CORN CRIBS

are so built as to admit air and exclude rain and snow.

Making the staves is simple. Erection rapid. Every farmer is a booster. Any concrete man can establish a good paying business manufacturing and erecting these cribs. Investigate our proposition. Write for details.



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½-yard Smith Tilting Mixer, on trucks, 8 hp. Steam Engine, 10 hp. Boiler, equipped with Auxiliary Hoisting Drum of 2,000 lbs. capacity.

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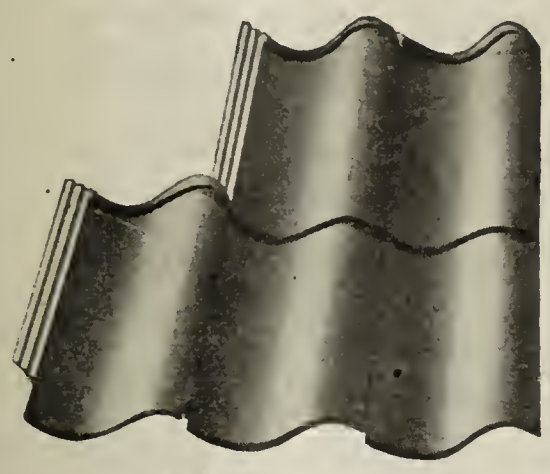

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Our newly improved and patented tile machines are provided with a new device that makes automatically interlocks on both ends and sides of our tiles—an accomplishment of immense value for the roofing tile problem and characteristic for our tiles only.

Buy the U. S. CHAMPION TILE MACHINES for making FRENCH or SPANISH TILE. They help progressive builders and concrete products manufacturer cutting down the high building material costs besides giving large returns from a small investment.

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No Lining Bars

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These Forms lock both horizontally and vertically, assuring a lastingly rigid, solid form—permitting the pouring of a story at a time.

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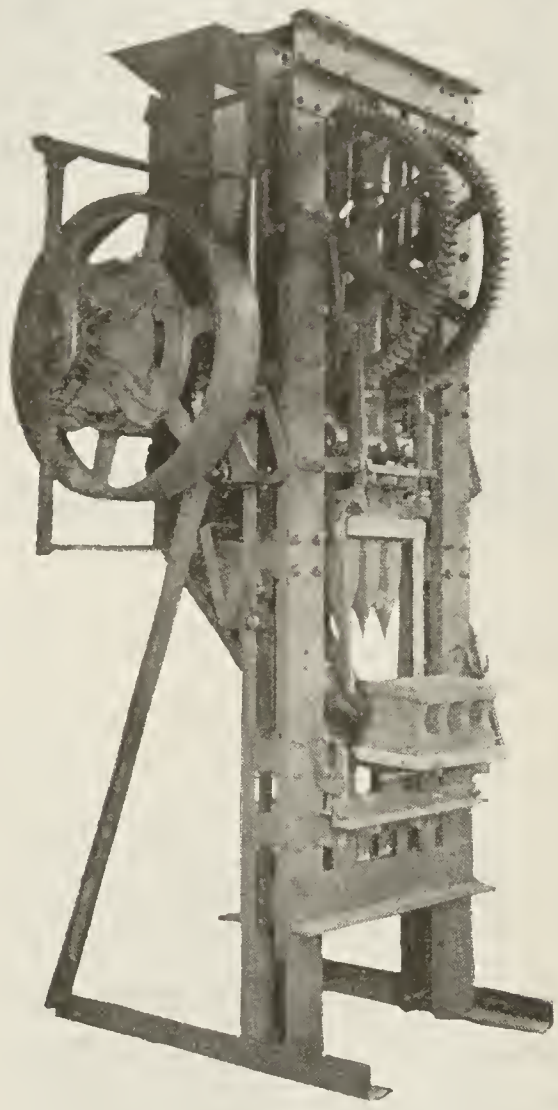

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The Hobbs Down Face Block Machine

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The Anchor Automatic Tamper made to operate over any type of block, brick or stave machine.

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Let us tell you more about this reliable line of equipment.

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Building Material of Beauty

Minimum absorption, maximum strength, light and easy to lay and produced in style, shape and design to meet any architectural requirements.

INEXPENSIVE **PERMANENT** **POPULAR**

Under one operation the stone are veneered with granite, marble or other natural products and sprayed as they come from the machine, producing a Reconstructed Stone in natures own beauty.

AN OPPORTUNITY

If you are interested in producing a high class building unit of standardized dimension, and desire to invest in a Real Manufacturing Business, WRITE US NOW.

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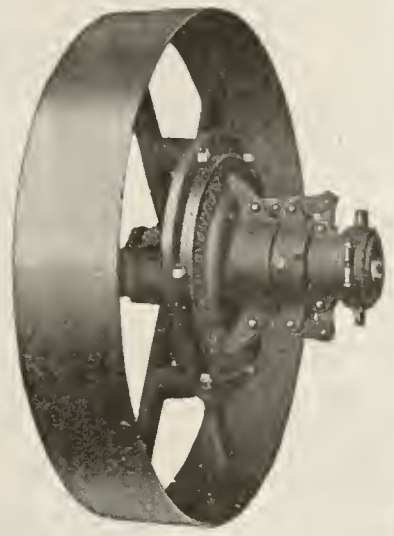
LITTLE FALLS **NEW JERSEY**

LITTLE DAILY LEAKS OF POWER BOOST YOUR COAL BILL

The High Cost of Power Is Reduced to a Minimum By the Use of a

Plamondon Disc Type Friction Clutch



The power of this clutch is unusual. The double toggles on this clutch develop such tremendous pressure that even on the largest clutches only a hand lever is needed to engage or disengage the clutch. The geared devices usually needed to operate large clutches are unnecessary.

This is only one of the practical advantages the cement mills find in this clutch. Write for our new catalog No. 59 and learn the rest of them.

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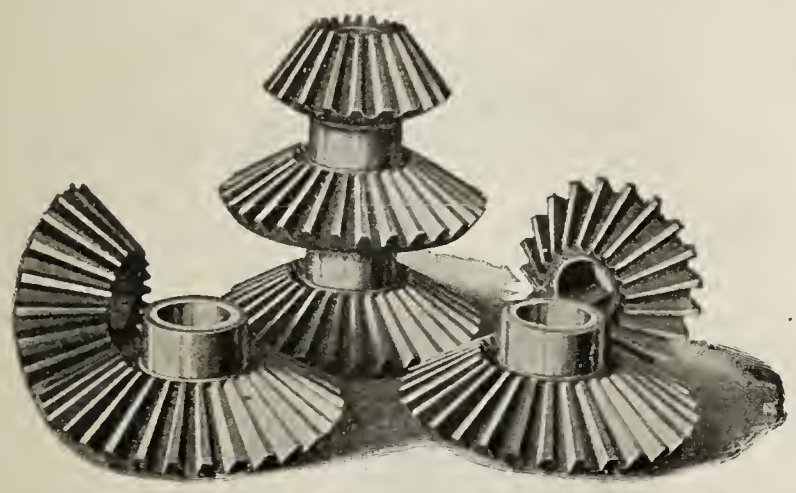

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Ganschow Bevel Cut Gears—like Ganschow Gears of every kind—are cut with an accuracy and precision which makes smooth, easy, effective working a certainty. They minimize wear and tear and insure long life to the parts. From twenty to forty per cent less power is required to operate

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as compared with cast gears, because of evenly-thick and evenly-spaced teeth, and because they are uniformly smooth. Throughout the whole machine the jar and strain are greatly reduced; and this means gear-efficiency from every standpoint.

As specialists in gear work, our splendid facilities enable us to take care of any requirement from the smallest gear up to 12 ft. in diameter—and do it QUICK. Every gear strictly according to specifications and free from defects.

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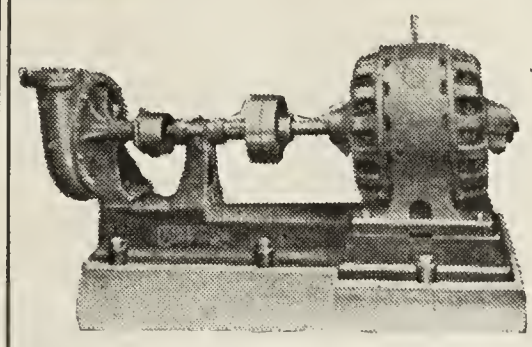
PUMPS



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Also a complete line of deep well plunger pumps.

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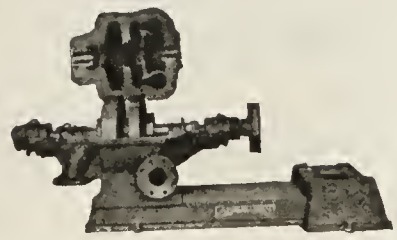

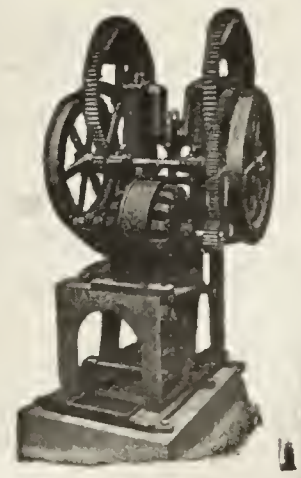

For Better Concrete, Stronger Mortar—use HYDRATED LIME

Increases Concrete Density

By virtue of its ability to fill the voids, Hydrated Lime increases the density of concrete. The mass becomes more watertight—practically impervious to water. Honeycomb and other structural weakness are also prevented. Hydrated Lime promotes intimate contact of the concrete mass with the forms and produces smooth, pleasing exterior surfaces.

Other Reasons Why You Should Specify and Use Hydrated Lime

because

1. Makes the mixing of Portland cement concrete more easy, inasmuch as it lubricates the sand grains and coarse aggregates.
2. Renders the concrete mix plastic enough to flow freely and smoothly with a minimum of excess water.
3. Makes the concrete easier to work after it is deposited in the forms, thus eliminating labor usually required for spading and tamping against the forms.
4. Eliminates the tendency toward cracking, because it minimizes alternate expansion and contraction due to moisture changes.
5. Promotes uniformity of the mass concrete by producing a colloidal or jelly-like medium through which the rock and matrix do not segregate, thereby producing a stronger concrete.
6. Materially and directly increases the ultimate compressive strength and efficiency of the concrete, by virtue of its ability to hold water in mechanical suspension and thus supplying the necessary moisture required by Portland cement in order properly to set and attain its maximum strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

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Marblehead Lime Co., Chicago—Kansas City

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Lee Lime Co., Lee, Mass.

White Marble Lime Co., Manistique, Mich.

Glencoe Lime & Cement Co., St. Louis, Mo.

Ste. Genevieve Lime Co., St. Louis, Mo.

Rockland&RockportLimeCorp. New York—Rockland, Maine—Boston

Hunkins-Willis Lime & Cement Co., St. Louis, Mo.

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

National Lime & Stone Co., Carey, Ohio

Ohio Hydrate & Supply Co., Woodville, Ohio

Woodville Lime Products Co., Toledo, Ohio

Merion Lime & Stone Co., Norristown, Pa.

American Lime & Stone Co., Tyrone, Pa.

Riverton Lime Co., Riverton, Va.

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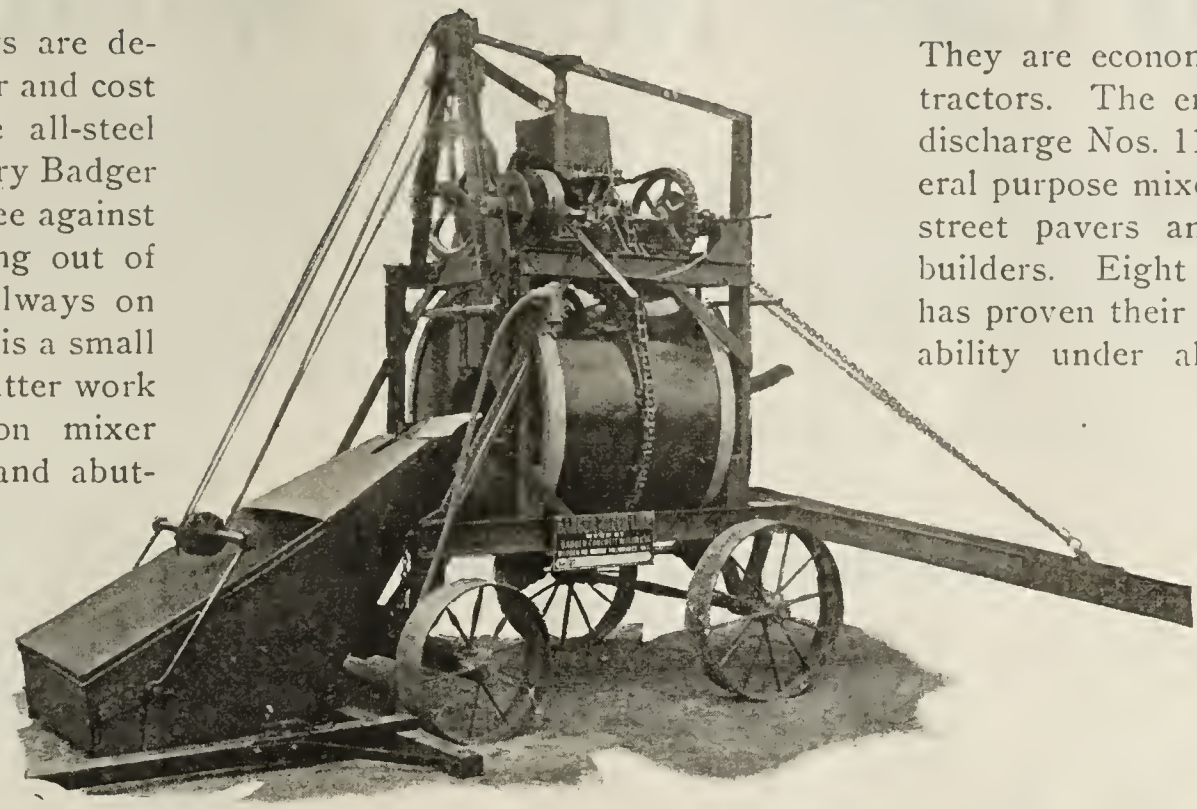
The Badger Mixers are designed to save labor and cost of operation. The all-steel construction of every Badger Mixer is a guarantee against breakage or wearing out of parts. They are always on the job, whether it is a small mixer on curb or gutter work or the construction mixer upon foundations and abutments or the alley and street paver. Their light weight and durability has made a distinctive reputation for the Badger Mixer.

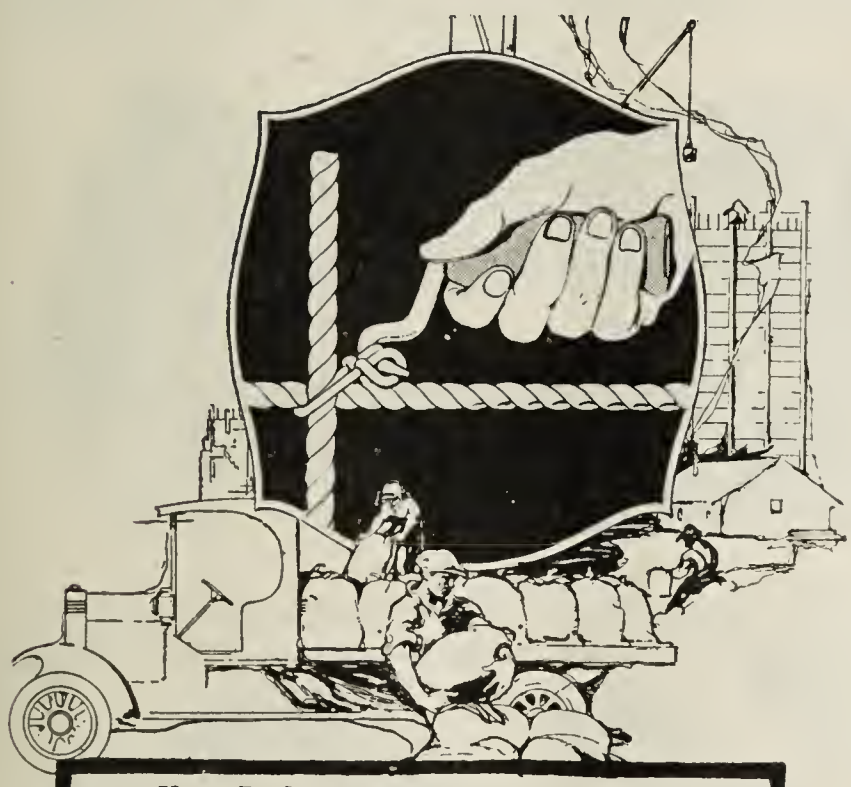


They are economical to the contractors. The end load and end discharge Nos. 11 and 15 are general purpose mixers and alley and street pavers and country road builders. Eight years of service has proven their absolute dependability under all conditions of concrete work.

Write for our attractive prices.

The ~ Badger ~ Mixer Line

BADGER CONCRETE MIXER CO., 13th Floor MAJESTIC BLDG. **MILWAUKEE, WIS.**



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The cost of your rod tying work is too high unless you now use the Bates Wire Rod Tying System. The Bates saves you time, money, and a novice becomes an expert "with one twist of the wrist." More rods tied in less time means money saved.

Write today for your Bates FREE Trial Rod Tying Outfit

The Bates FREE Trial Rod Tying Outfit containing one "Simplex" Hand Tying Tool and 10 each of 4, 5, 6 and 7-inch Bates Wire Ties will be sent on receipt of your signed agreement to use this Rod Tying Outfit on your work for 15 days and then send us $1.50 or return the tool. **These trial ties cost you NOTHING.**

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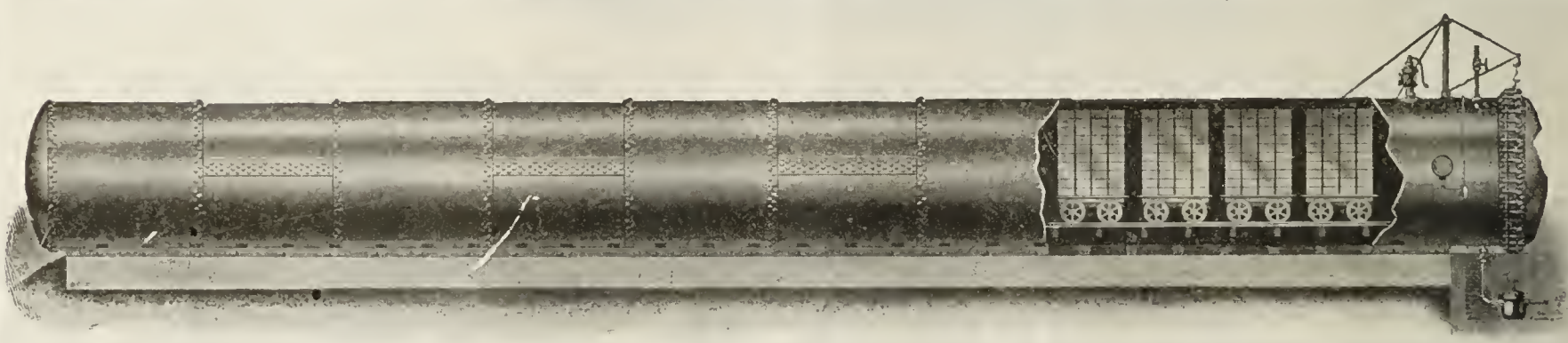

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Have successfully passed some of the most severe tests. Long life and moderate price. Immediate shipment on stock sizes. Write for prices.

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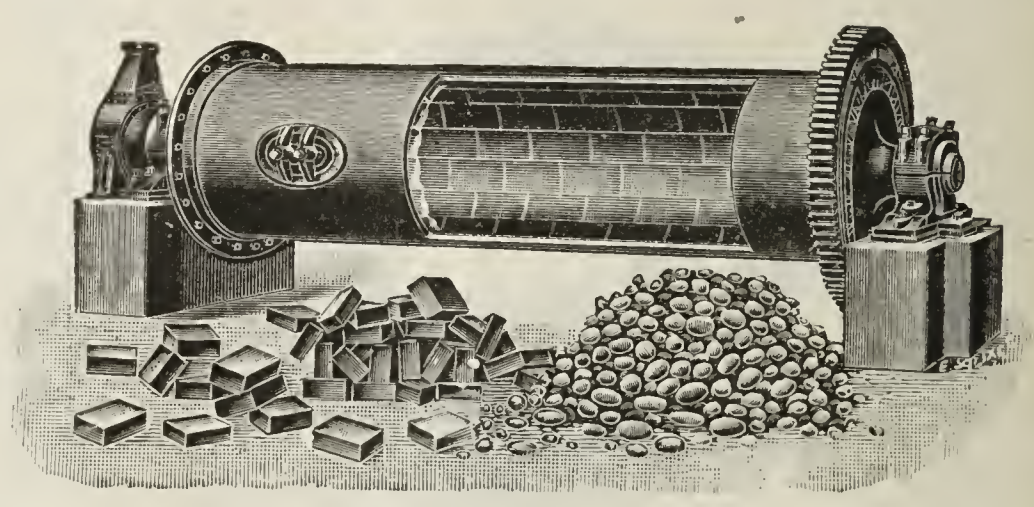

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For High Pressure Work
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We make quick service a feature of our business

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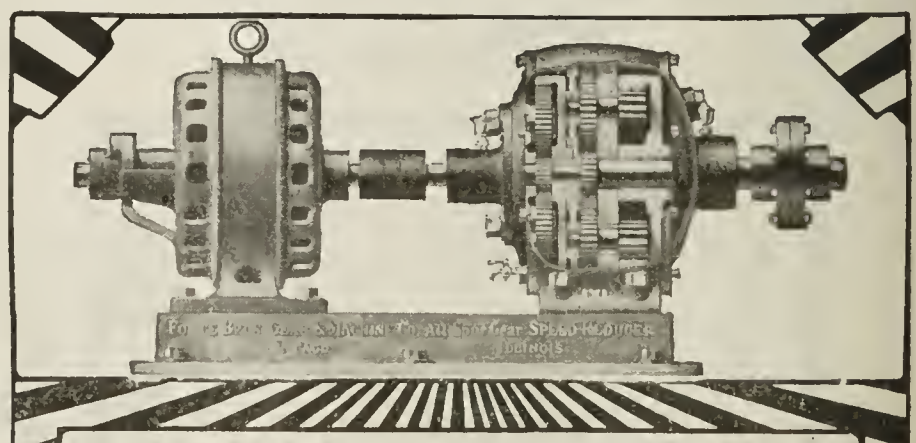

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Write to us, state the conditions that exist in your plant, and get the advice of our engineering department.

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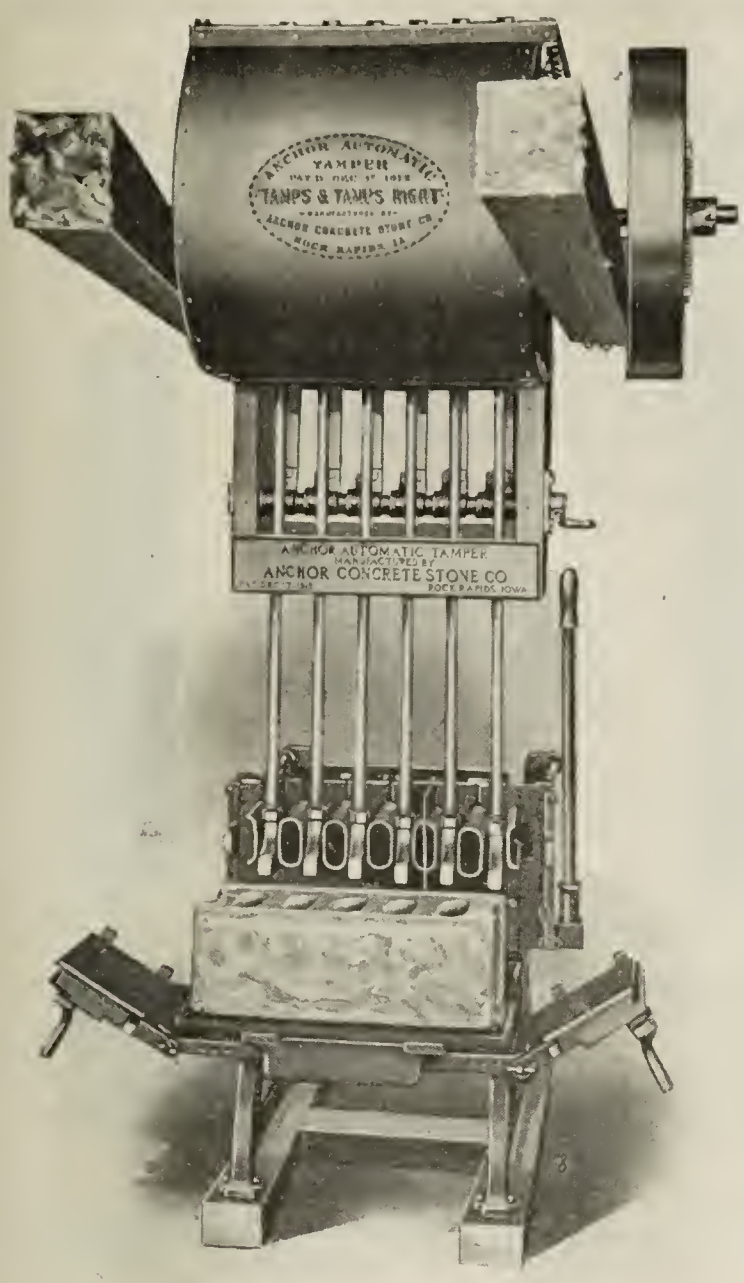

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ANCHOR AUTOMATIC TAMPER

will make money for you if you will give them a chance. The finest faced blocks in the world can be made on the Hobbs machine and yet this same machine will make plain blocks very rapidly.

The Anchor Automatic Tamper is made to operate over any type of Block, Brick or Stave machine with satisfaction absolutely guaranteed.

We also manufacture the following well known machines:

The Post Economy Punch

The Anchor Continuous Air Space Block Machine

The Anchor Batch Mixer—a mixer designed for concrete products plants.

Let us tell you more about this reliable line of equipment.

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Home Office: Rock Rapids, Ia. Branch: Columbus, O.

for facing concrete work

FOR the stucco suburban home—the modern public utility plant and factory—the bank and office building—first call is for Middlebury Terrazzo for facing concrete work.

Middlebury Terrazzo has all the appearance of solid marble—with all its advantages and at a material saving in price.

Made from Middlebury White and Crême Statuary Marbles, it is furnished, carefully graded to size, in either dust, No. 1, 2 or 3.

Send today for free samples and prices

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Sizes 3/8 to 1¼ inch. Lengths up to 85 feet. Shipments can be made promptly

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Many buyers now take advantage of facilities at mill by ordering bars cut to length, bent to shape, and tagged—ready for placing.

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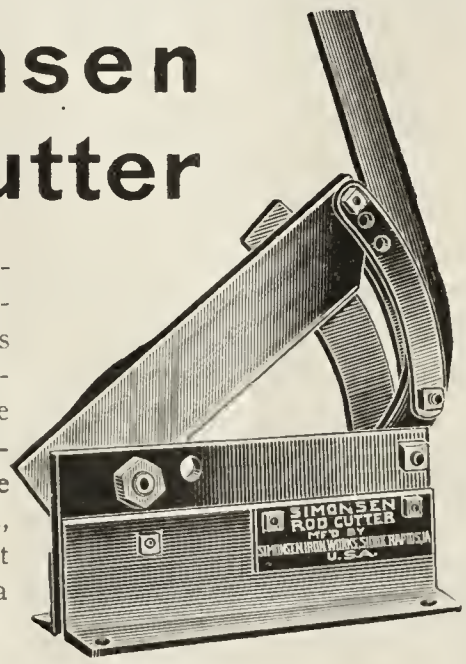
Simonsen Bar Cutter

Is designed especially to meet the requirements of builders in concrete construction needing a portable shear for cutting reinforcing bars on the job. It's a practical, low-priced shear that will pay for itself in a short time.



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Cutting Jaws are of the "welded in" type, our own patented design. Lower or stationary jaw has a keen edge of hardened tool steel and is practically indestructible. Upper jaw does the actual cutting and is hinged at rear end on a heavy case hardened steel pin. It's reinforced.

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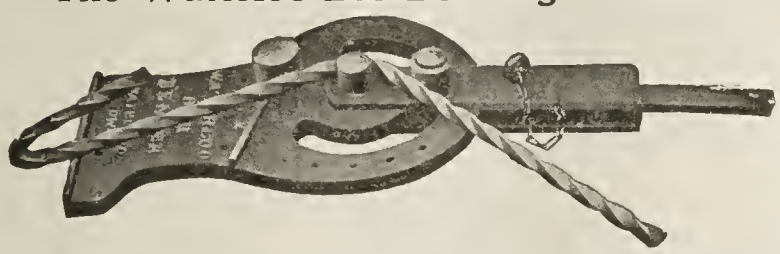

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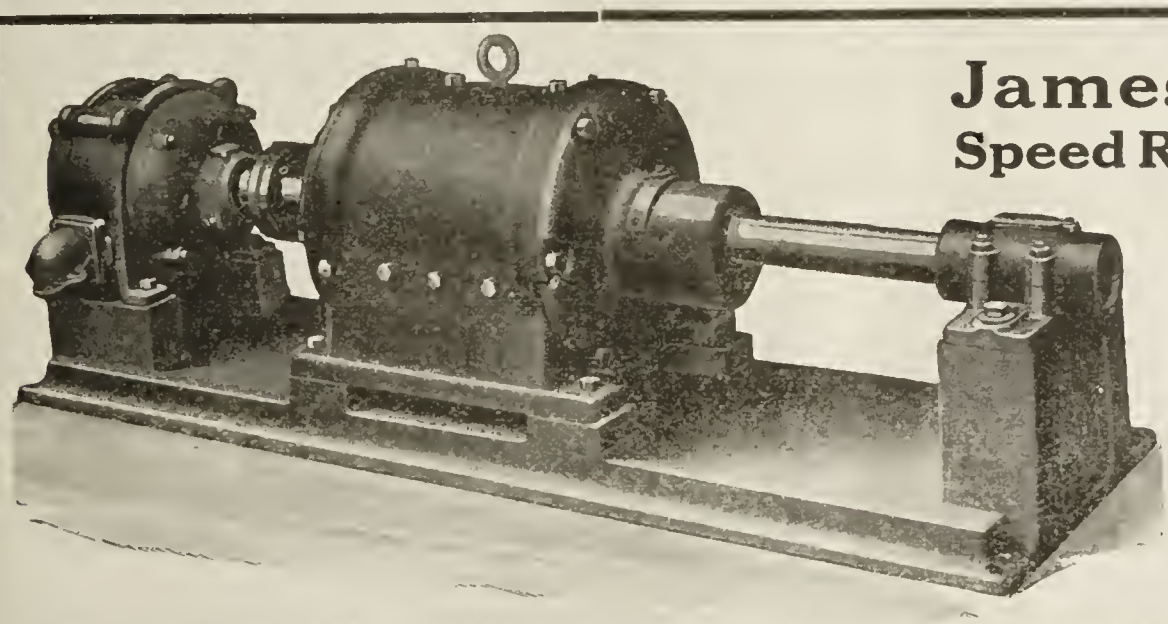

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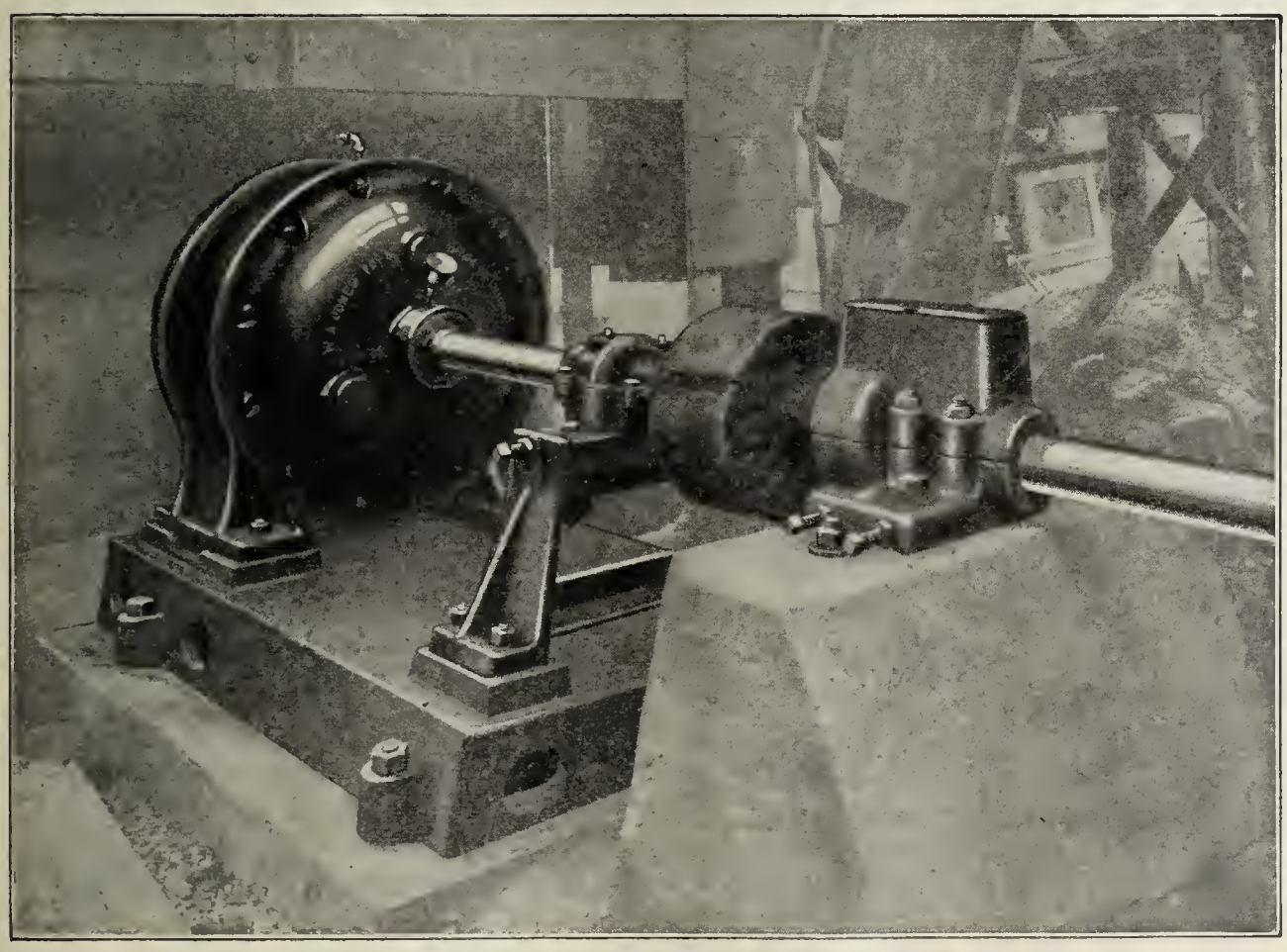

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CEMENT AND ENGINEERING NEWS

with which Gravel & Stone Magazine is Incorporated

22 Quincy Street, Chicago.

(PUBLISHED MONTHLY)

William Seafert, *Publisher and Editor*

J. F. Waldron, *Advertising Manager*

R. M. McCully, *Business Manager*

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Advertising Rates Sent on Application

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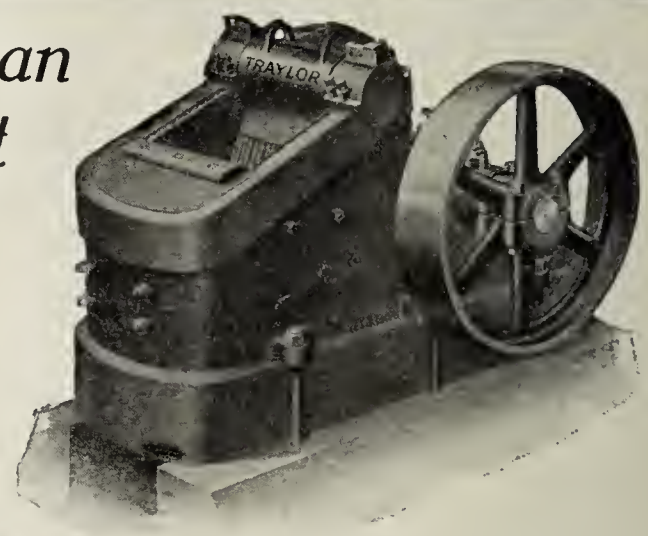

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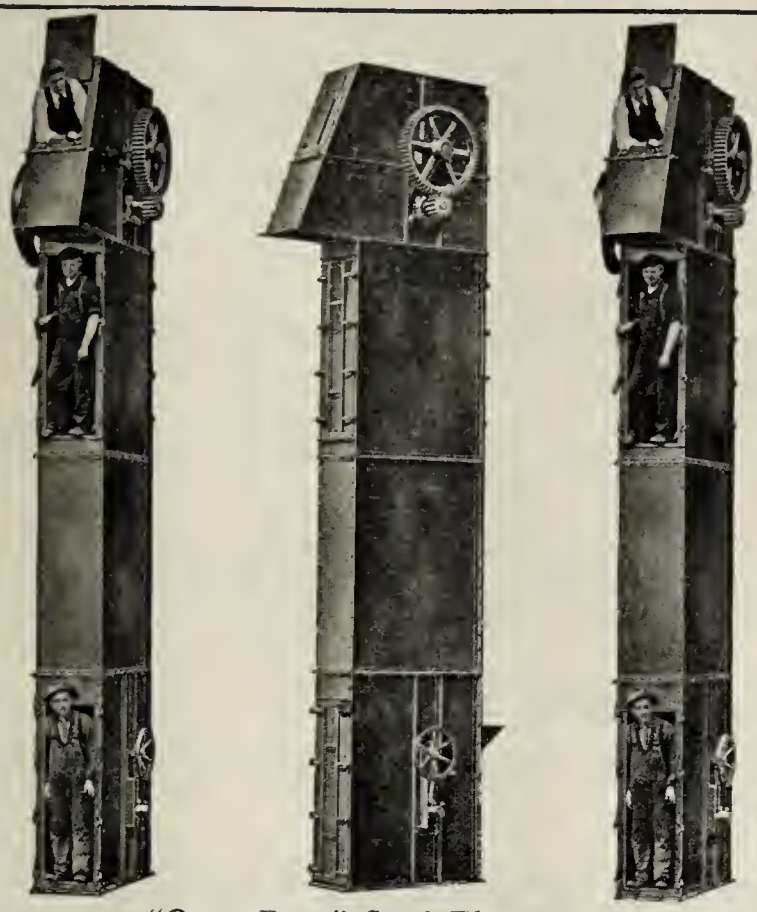

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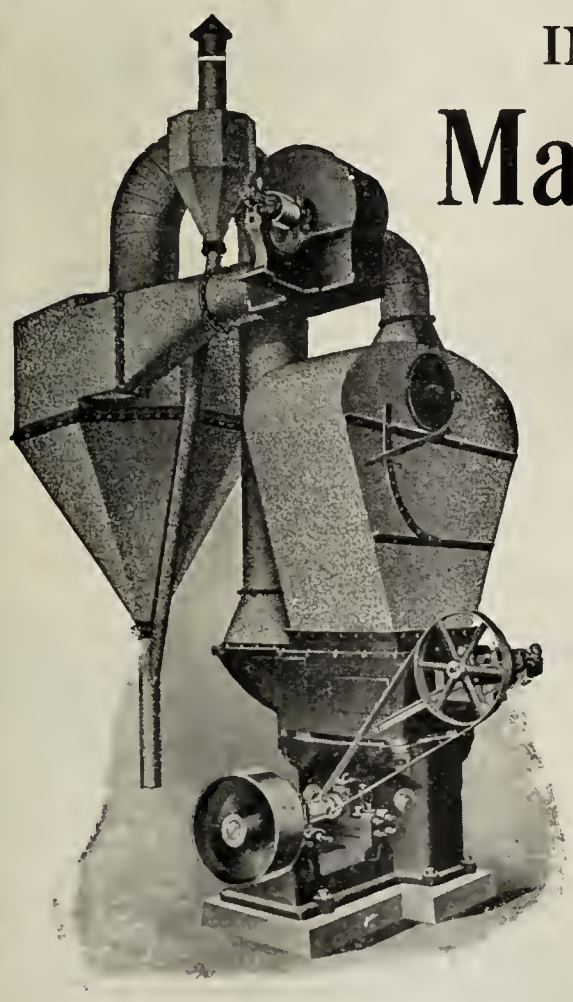

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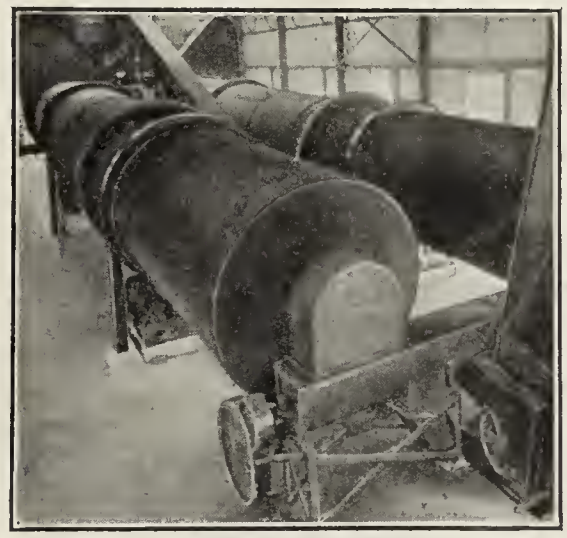

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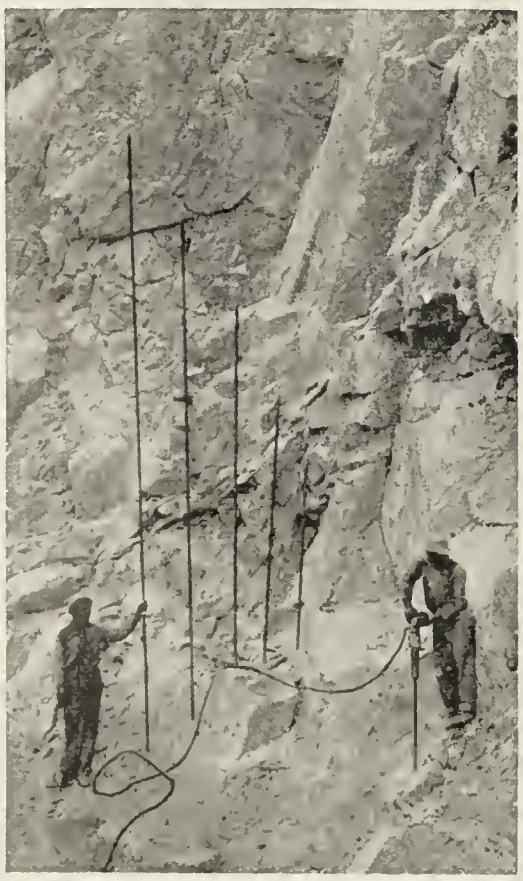

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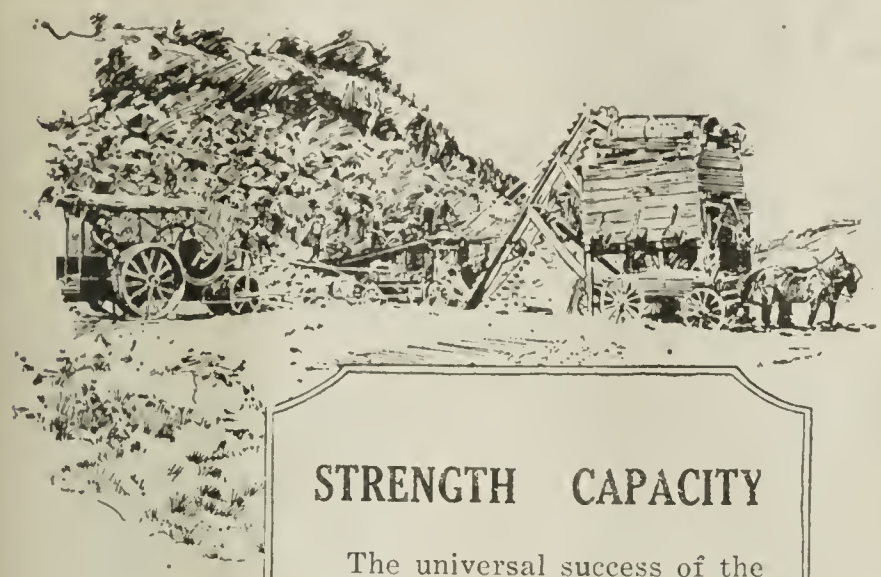

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STRENGTH to stand up under severe shock and strains, assuring long life; and

CAPACITY, the ability to turn out the greatest amount of work with least expenditure of time and horsepower.

These profit-making factors are possible only with correct design and the experience gained by years of successful manufacture.

Write today for catalog 28 and complete data.

Austin Manufacturing Company

New York Chicago
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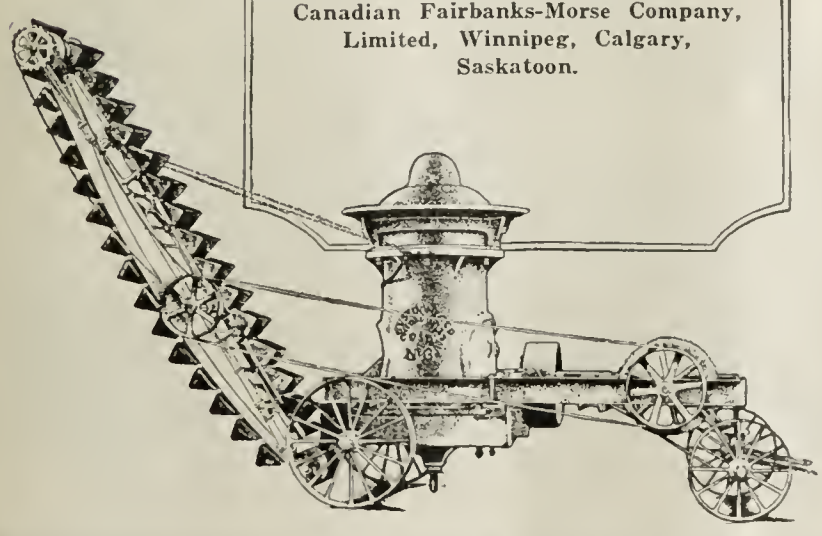
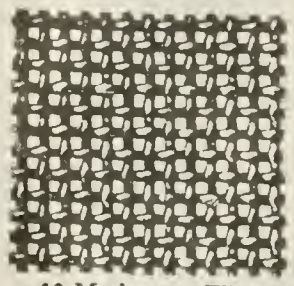
Canadian Agents:

Mussens Limited, Montreal, Toronto, Vancouver
Canadian Fairbanks-Morse Company, Limited, Winnipeg, Calgary, Saskatoon.

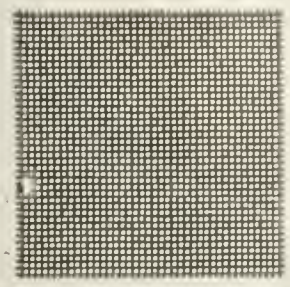


Cleveland Double Crimped WIRE CLOTH

2½ Mesh; .105 Wire



12 Mesh; .047 Wire



40 Mesh, .0135 Wire

You should use our screens because a uniform fineness of screened product is assured by an even, accurate mesh. This is a characteristic of "Cleveland" Double Crimped Wire Cloth.
Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

The Cleveland Wire Cloth & Mfg. Co.
3579 E. 78th Street, CLEVELAND, OHIO

SWABY

Gravel and Dredging Pumps

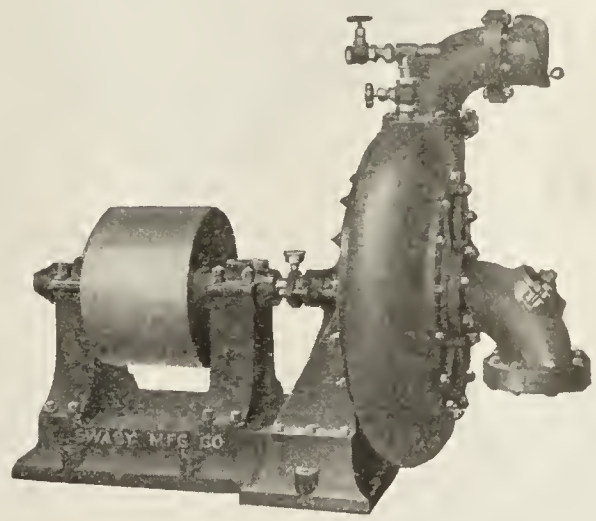


Illustration shows belted outfit but can also be supplied direct connected to Vertical Engine upon same base.

Swaby Manufacturing Co.
2010 MARSHALL BLVD.
CHICAGO, ILL.

"WE ARE GLAD"

TO RECOMMEND

GRUENDLER

AUTOMATIC PULVERIZER

"Because it has proven beyond doubt its Reliability,. Speed Power and Dependability.

"These are the reasons why we gladly recommend the Gruendler crusher and pulverizer, which we have been operating in our plant for the past four years. Its repair costs are unusually low, it requires very little power and it turns out a clear uniform product with great rapidity. We are well pleased with our Gruendler pulverizer."

(Signed) W. D. GEARHART, Mgr. Illinois Limestone Co.,
Robinson, Ill.

EQUIP YOUR CRUSHED STONE PLANT WITH A

GRUENDLER

AUTOMATIC PULVERIZER

It will increase your output, lower your costs and deliver a more uniform material.

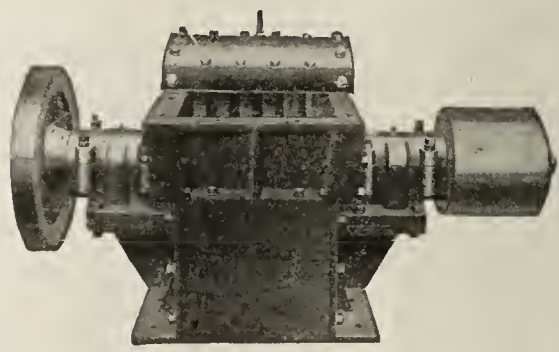
A powerful mill, built for long service and uses less horsepower, giving greater capacity due to our improved features, Ball-Bearings and Sledge Hammer Principal. Our price is right.

"35 years of square dealing our guarantee." Built in standard sizes, 3 tons to 3,000 tons daily.

Literature describing each model in detail ready for you. Send today.

GRUENDLER PATENT CRUSHER & PULVERIZER CO.

904 No. Main St.
ST. LOUIS, MO.



PLANT OF THE ILLINOIS LIMESTONE CO.

ATLAS NON-FREEZING

the new high explosive that will not freeze

Zero—20 below—40 below—60 below—the coldest temperature known to man cannot affect Atlas Non-Freezing. It does not freeze, it will not freeze, it CANNOT freeze.

Ever since the invention of dynamite, the ideal has been a high explosive that would work as well in Midwinter as in Summer—that would end thawing forever. In Atlas Non-Freezing the Atlas Powder Company has achieved this goal.

Atlas Non-Freezing, the result of years of experimental laboratory work, is offered to the trade only after exhaustive field tests have proved its superiority for every class of work in which high explosives are employed. It has been used in quarries, pits and mines; in rock, earth and ore; at every range of temperature from torrid to below zero.

Atlas has succeeded in producing a non-freezing powder that will not explode prematurely. Its use ends headaches from handling or fumes; there are no objectionable fumes. It insures safety. Use nothing weaker than a No. 6 blasting cap to detonate it. It has the stability and uniformity that distinguish other Atlas High Explosives, with the added quality of non-freezing.

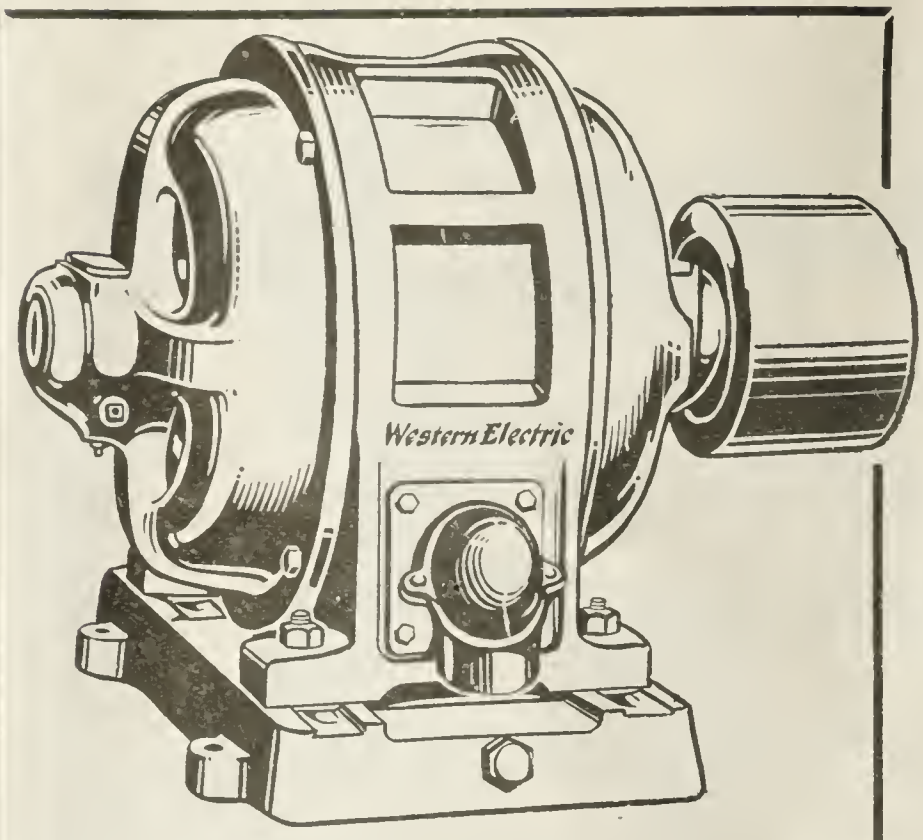
Atlas Non-Freezing is made in five grades, for every blasting requirement.

Tell us what explosive you are using. We will tell you the grade of Atlas Non-Freezing for your work.

ATLAS POWDER COMPANY
Wilmington, Delaware

Branch Offices:—Allentown, Pa.; Birmingham, Ala.; Boston; Chicago; Des Moines, Ia.; Houghton, Mich.; Joplin, Mo.; Kansas City; Knoxville; McAlester, Okla.; Memphis; Nashville; New Orleans; New York; Philadelphia; Pittsburg, Kans.; Pittsburgh, Pa.; Pottsville, Pa.; St. Louis; Wilkes-Barre.

NO thawing — NO headaches — NO objectionable fumes



DID YOU EVER STOP TO CONSIDER

That we have spent years of our time on your electrical problems? Years of untiring efforts which embraced university training, laboratory tests on material, plant analysis, etc? We offer you today the services of men from our organization who can carry your problems through to a successful issue, can meet your emergency just the same as we met others.

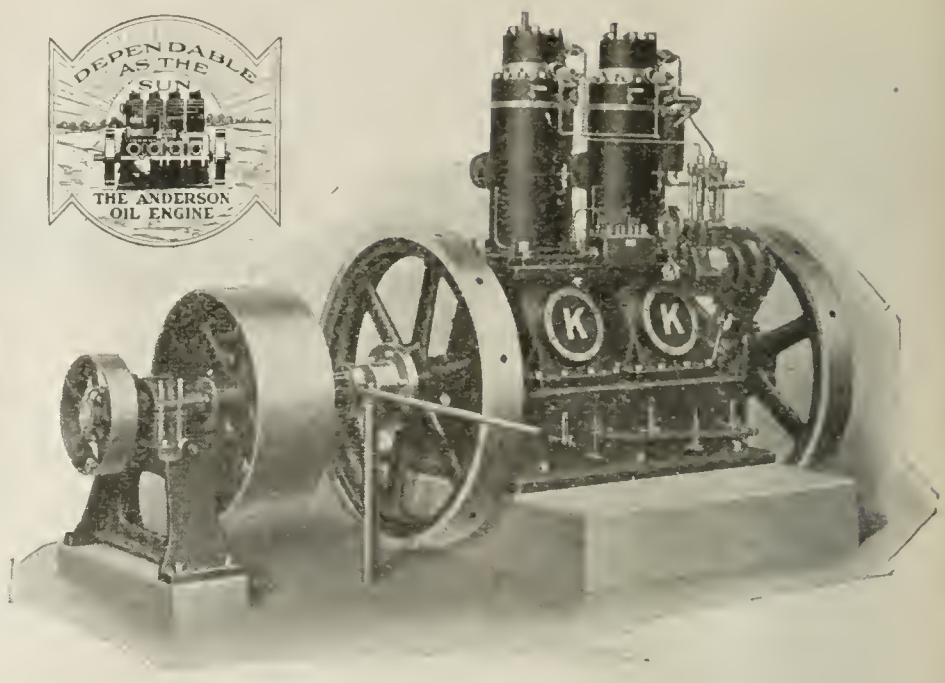
We are specialists in Motor Designing, Motor Building, Coil Building and Power Surveys. The knowledge we have gleaned after making a thorough study of cement mill plants and their operation, the experience we have gained through making the cement industry our choice of operations and our factory facilities we offer you now. We know we can be of aid to you and we also know you have your electrical problems to solve.

An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States.

Lansing Electric Engineering Co.

All the Name Implies

Lansing, Michigan



The New Type K Anderson Oil Engine

Is the LAST WORD in Semi-Diesel Engines

Sizes 15, 20, 25, 30, 40, 60, 80, 90, 120, 135, 180 and 225, one, two, three or four cylinders.

It takes all loads successfully.
It operates without water in the mixture.
It makes little to no smoke.
It uses the cheapest fuel oils.
It has removable chain oiled bearings.
It will pay you to investigate.

WRITE NOW FOR THIS CATALOG.

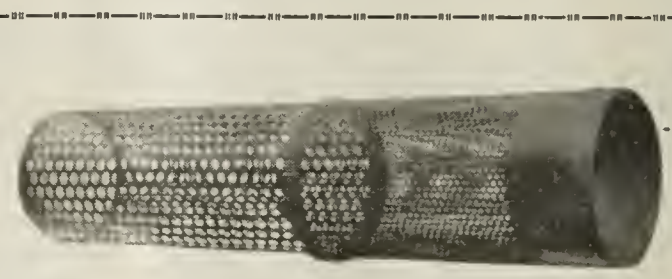
ANDERSON FOUNDRY & MACHINE COMPANY

A.F. & M. Co.

FOUNDED IN 1872 CAPITAL $1,400,000.00

ANDERSON, INDIANA, U.S.A.

PERFORATED SCREENS



Made to suit your requirements. Advise diameter, length, thickness and size of perforations required.

NORTMANN DUFFKE CO.

1220 27TH AVE.

MILWAUKEE - - WIS.

BATES
VALVE BAGS

INSURE SAFE DELIVERY

If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

THE VALVE BAG CO. OF AMERICA

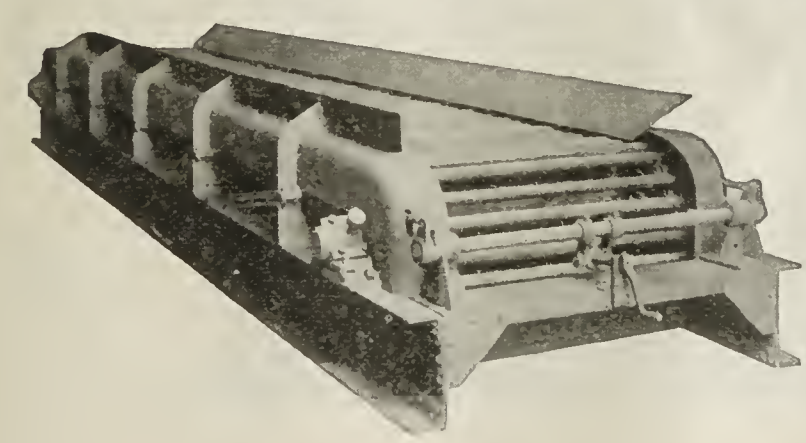
TOLEDO, OHIO

CHALMERS & WILLIAMS

ANNOUNCE

Beginning Jan. 1st, 1921, arrangements for the manufacture and sale of the

ROSS AUTOMATIC DROP BAR GRIZZLEY-FEEDER AND SCREEN



For use in mining, smelting, sand, gravel, crushed stone, coke, blast furnace and numerous other plants.

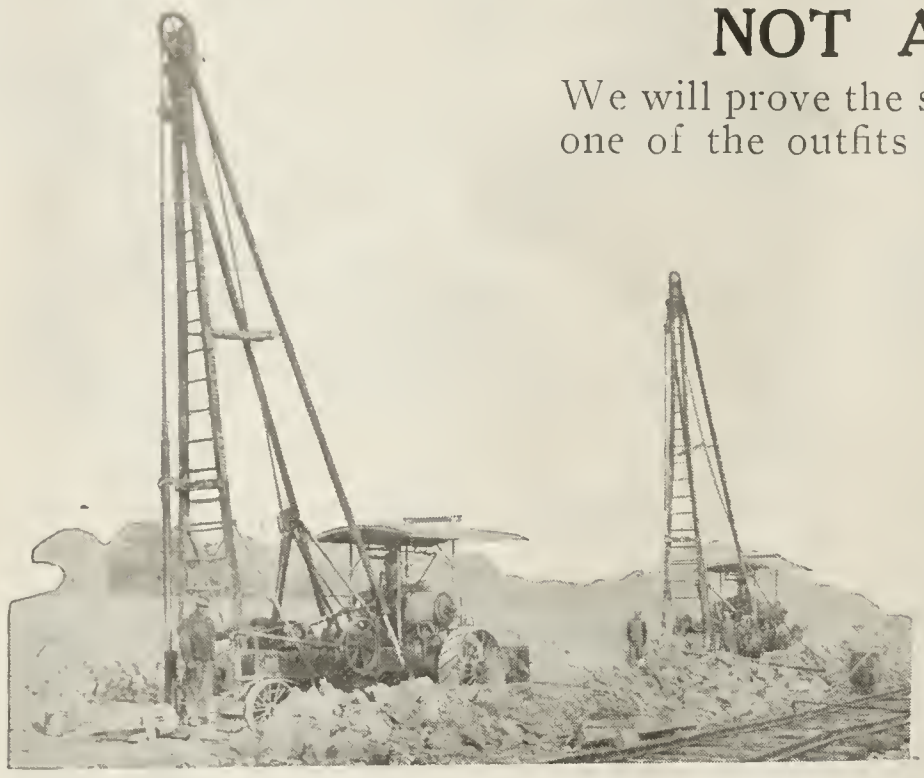
Cannot block or choke—will handle material at an even rate for 24 hours a day without labor or attendance.

Write for information to

CHALMERS & WILLIAMS

1445 Arnold Street CHICAGO HEIGHTS, ILLINOIS

THE BEST BLAST-HOLE DRILL ON EARTH
THE CYCLONE No. 14



NOT A BOAST—A FACT

We will prove the superiority of the No. 14 Drill by placing one of the outfits on your work against any or all other makes.

If the Cyclone doesn't out-drill and out-wear all other drills, we will remove it from the work without cost to you.

Our proposition gets below the paint. It demonstrates what the machine will do—not what may be said about it. It puts buying on a strictly engineering basis where it belongs.

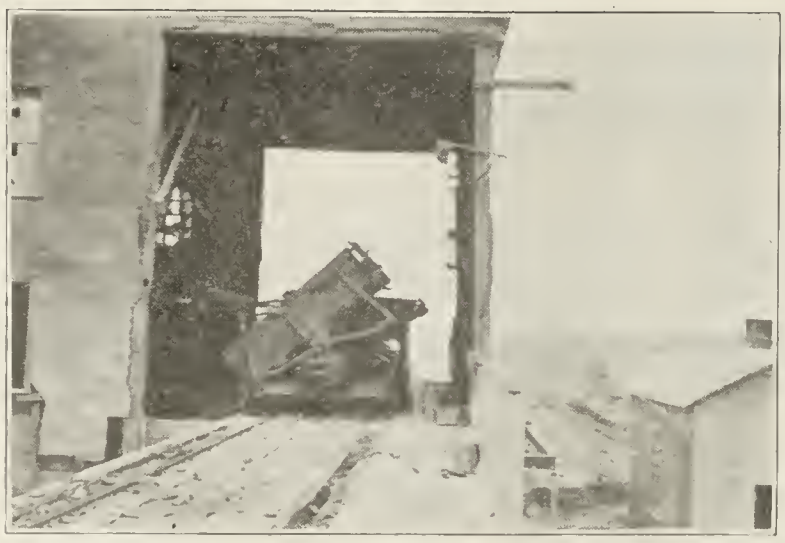
Furnished in Steam, Gasoline, Compressed Air or Electric Power, Traction or Non-Traction.

Let us send you full particulars

THE SANDERSON CYCLONE DRILL CO.
ORRVILLE, OHIO

Eastern and Export Office
30 Church St., New York

Dump Cars in Cement Manufacture



Northwestern States Portland Cement Company's Western 6-yd. dump cars at crusher.

Western

That's Why

Portland Cement Plants are installing Western 6-yd. dump cars, where standard gauge equipment is desired, and Western 4-yd. or 5-yd. cars, where narrow gauge.

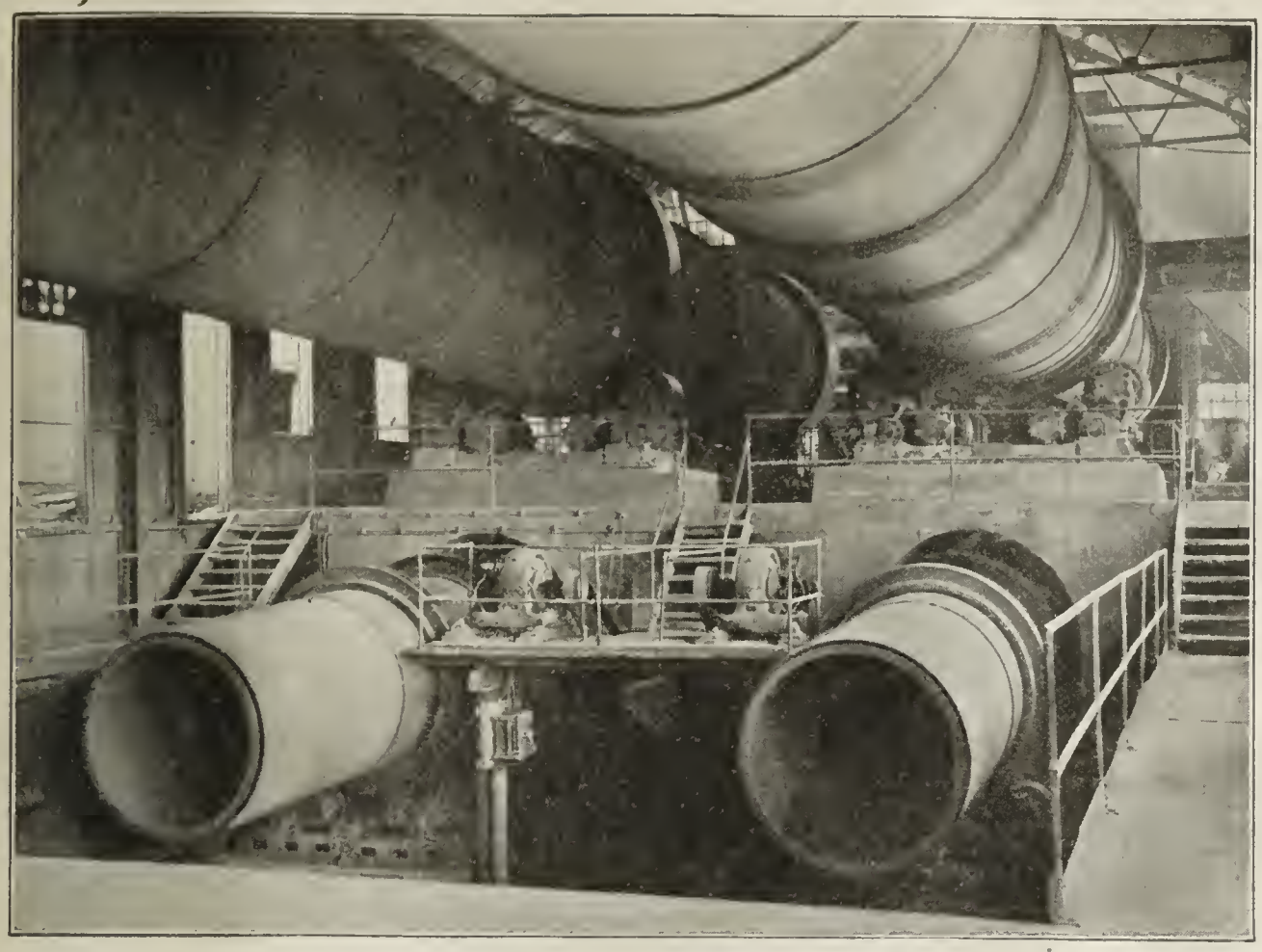
Local conditions determine the size of car, but almost invariably it is a **Western**—for stripping, for handling shale and often for handling stone.

The Lehigh Portland Cement Company, in stripping off shale, dumps a train of six 4-yard Western cars in from 17 to 25 seconds, without stopping the train, and keeps it up all day.

Whatever your haulage problem, there is a Western car that will solve it. Let us help if we can.

Write Today

Western Wheeled Scraper Company
Earth and Stone Handling Equipment
Aurora, Illinois



10′x175′ KILNS AND ROTARY COOLERS

TYPICAL
ILLUSTRATION
OF DESIGN
AND
CONSTRUCTION
OF

KILNS

AND

COOLERS

FOR
MODERN
CEMENT PLANTS

BULLETIN 1457
AT YOUR REQUEST

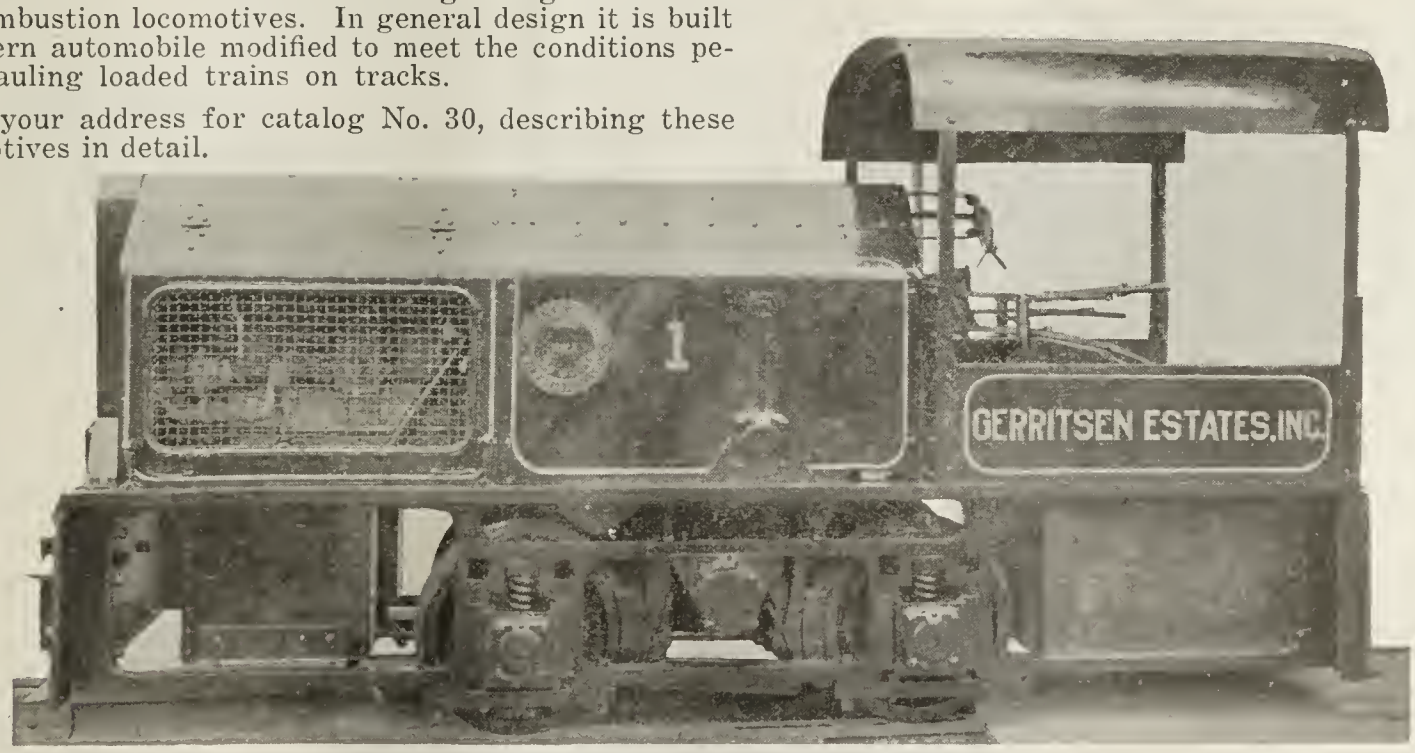
ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

VULCAN INTERNAL COMBUSTION LOCOMOTIVES

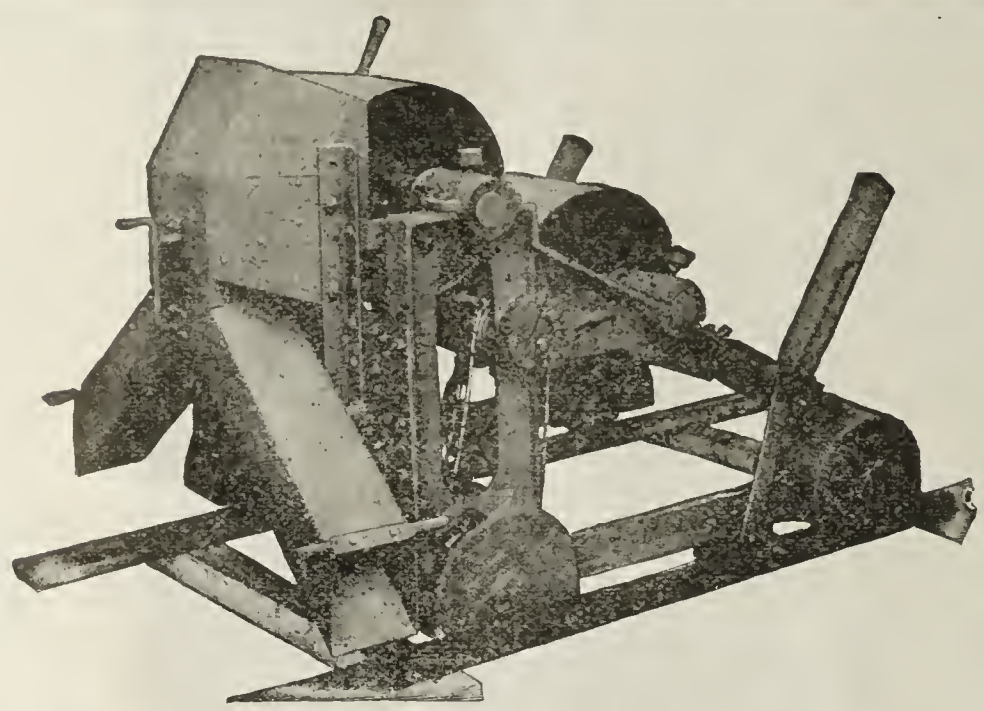
This new Vulcan Locomotive meets the growing demand for internal combustion locomotives. In general design it is built like a modern automobile modified to meet the conditions peculiar to hauling loaded trains on tracks.

Send us your address for catalog No. 30, describing these new locomotives in detail.



VULCAN IRON WORKS

1740 Main Street *Established 1849* **Wilkes-Barre, Penna.**



Modern methods
demand the small conveyor

What about *your* requirements? Can you use a small belt conveyor to facilitate the handling of materials?

Dodge standardized conveyors are made in all practical sizes and in two general types—troughed and flat.

The flat conveyor is in more common use but the troughed type increases the carrying capacity of the belt from 50 to 75 per cent depending upon the angle of the side.

The Dodge standardized line includes conveyors, trippers, feeders, trommels, etc.

Our 160 page elevator and conveyor catalog makes the selection of conveyor details a simple matter.

It will be sent if you ask for it.

DODGE

Dodge Sales and Engineering Company

Mishawaka, Indiana and Oneida, New York

Canadian Manufacturers, Dodge Mfg. Co. of Canada Ltd., Toronto and Montreal

Chicago St. Louis Atlanta Philadelphia Pittsburgh Boston Cincinnati
New York Newark Minneapolis Houston Seattle

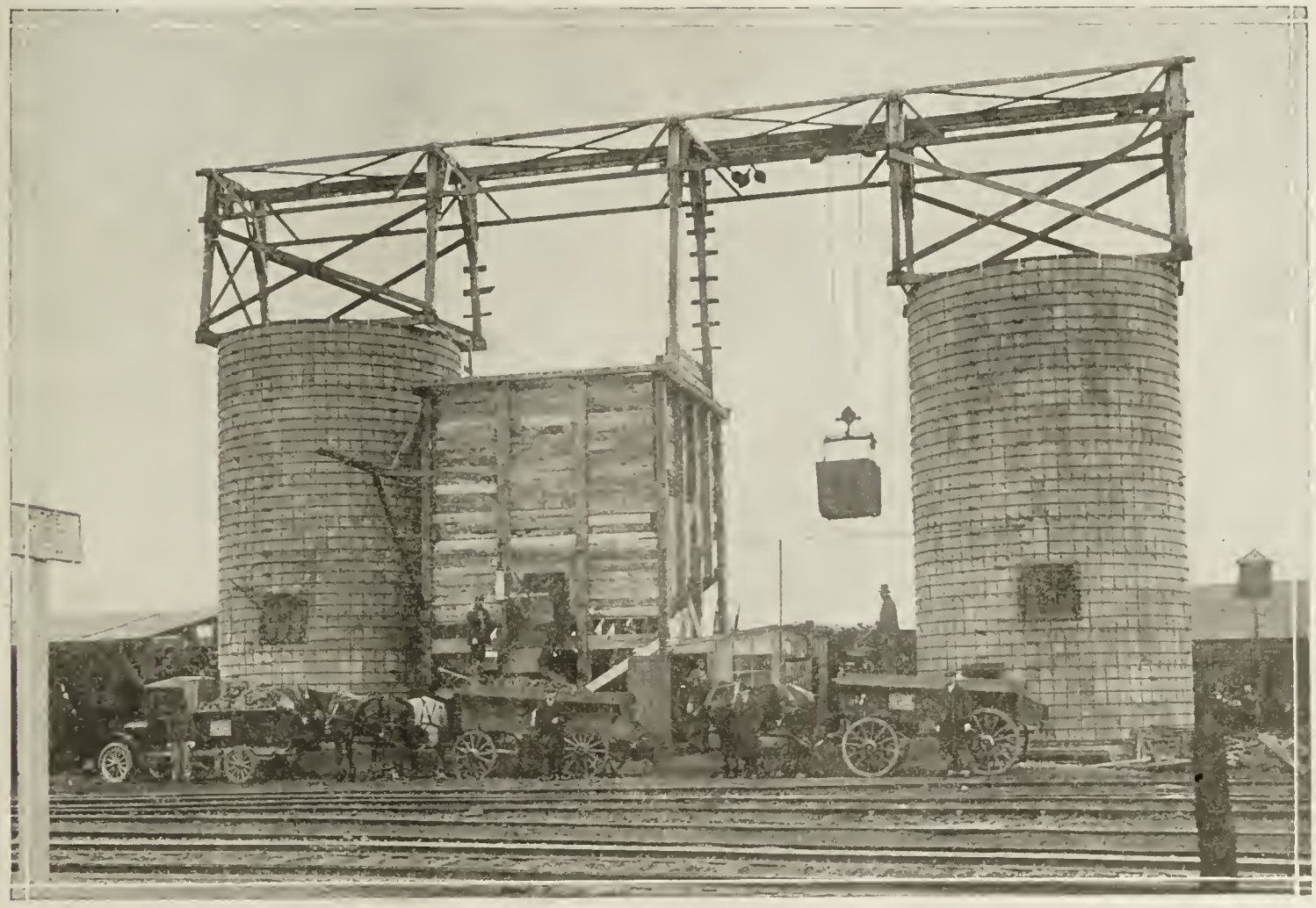
Cement and Engineering News

Vol. 33 Chicago, June, 1921 No. 6

Coal Pockets Built of Concrete Staves

Concrete staves are being used in the construction of coal pockets. The recent car shortage of the railroads has not only put coal dealers, but industrial plants as well, on the lookout for some method of protecting themselves from a coal shortage. Coal pockets have been in use throughout the Central West for a number of years. They have demonstrated to their owners the feasibility and cheapness of handling coal by mechanical means. By the use of power conveyors, and concrete stave pockets for storage, coal can be handled from the unloading in cars to the storage in bins and thence to the loading of wagons or trucks, at a cost of 4½ to 5 cents per ton. This is a saving of from 55 to 65 cents per ton on the old method of handling. Not only this, it permits the dealer, or industrial plant, to store coal during the summer months, when the price is considerably cheaper and there is an abundance of cars. The demand for concrete stave coal pockets is so great at the present time that manufacurers are confining themselves to this branch of manufacturing entirely.

The W. G. Haskell Co., Cedar Rapids, Iowa, sells 25,000 to 35,000 tons of coal a year. It takes six trucks and three teams to deliver this coal. Scarcity of trackage property demands the business to grow up instead of spreading out, so three 16-ft. diameter coal pockets, 25 ft. high, were erected by the Concrete products Corp., Cedar Rapids, Ia., John H. Irey, manager. Each pocket holds 125 tons of coal. Eventually more pockets are to be added, and the three pockets already constructed to be increased in height from 15 ft. to 20 ft. In that case the trestle frame will be raised and placed upon the pockets, instead of supported upon its own foundation.



Concrete stave coal bins of the J. M. Clark Coal Company, Lafayette, Ind. This system unloads and stores coal at rate of 30 tons an hour, with equipment that is operated by only one man. They are doing the work with an American trolley carrier, manufactured by the Conveyors Corporation of America. It is said this system handles coal at an average cost of six cents a ton.

The present pockets, with the Godfrey conveyor, will handle five to six carloads of coal a day, at a cost of $1.00 per ton. Less than 5 cents a ton is allotted for loading trucks and wagons in this figure of cost per ton handled. In this figure consideration of increased delivery from a third to a half is not taken as a factor—so the cost of handling and delivering would be much less than the figure quoted.

These coal pockets are made of concrete staves like those used in silo construction, the difference being in the use of 5/8 in. bands in double the number for ordinary silos. The staves are power tamped.

The Haskell company prepared the pit, following the blue prints furnished by the Godfrey Conveyor Co. The Products company laid the foundation for the pockets and erected the three pockets in six days, one pocket including its foundation, taking two days with four men.

Wood scaffolds were used. The cost of erection is reported as one-third less than monolithic pockets, and they were ready for use the next day after erection. Another advantage is in the fact that these pockets can be erected on leased ground, taken down and rebuilt on any other site.

The conveyor installation was erected by Godfrey's crew. The chute is made and installed by Concrete Products Corp. In a pinch the coal stored below the chute level can be shoveled out by hand. This is recommended only in a pinch. The 1-ton conveyor is ready to receive its load instantly the door is raised. On the other side of this door is the pit that receives the coal when dumped out of the car. Gravity forces the coal through this door into the bucket; the bucket is raised to the trestle and moves along the trestle to the pocket where the coal is desired.

Concrete Aggregate Association

The Illinois Concrete Aggregate Association has heretofore been an organization composed merely of sand and gravel concerns. M. D. Schaff, re-elected president, however, proposed at the annual convention recently held in Chicago, that the stone interests in the state be invited to membership, inasmuch as "this industry is so closely allied to the sand and gravel industry. "The motion was adopted and it is expected that at the next annual meeting the various stone concerns and quarries will largely hold membership in the association.

Subsequent to the election of officers, and at the close of the morning session, R. M. Field, traffic manager of the Peoria Association of Commerce, spoke before the association luncheon on "Co-operation in Our Transportation Problems Today," pointing out the avenues of co-operation open to the concrete association with the railroads in the matter of transportation, the formulation of a workable interstate transportation plan and the industry's prospect under the coming Republican administration.

Molds for Double Walls

Universal Cement Mold Co., North Milwaukee, Wis., is distributing a folder devoted to the portable molds it manufactures for double wall concrete house construction. These are strongly built, light steel molds, fitted with handles, capable of molding a small section of wall at one filling. After filling, the mold is moved along the wall and again filled. Attachments make it possible to pour corners, build bay windows or other angles, make solid walls, or pour chimneys or pilasters. Further information may be obtained from the manufacturer.

Beware of Shortage of Sales—and of Salesmen!

Don't neglect your busiest and best-known salesman —Advertising. The reputation and good-will which this salesman has built up is your most valuable asset. Keep Advertising at work steadily and intensively and don't skimp on its expense account. A niggardly policy at this time towards any department of your sales work is the poorest kind of "economy." It may lose for you, within a few months, more than you have gained in years of sustained effort.

The man who succeeds in a big way is the man with "vision," the man who has sufficient foresight and sufficient faith in the future of the U. S. A. and the world generally, to plan years ahead. Such a man never neglects his advertising and sales organization; nor does he fail to provide the resources necessary for carrying them on. To do otherwise is to court disaster.

A Research Information Bureau

The National Research Council has established a Research Information Service as a general clearing-house and informational bureau for scientific and industrial research. This "Service" on request supplies information concerning research problems, progress, laboratories, equipment, methods, publications, personnel, funds, etc.

Ordinarily inquiries are answered without charge. When this is impossible because of unusual difficulty in securing information, the inquirer is notified and supplied with an estimate of cost.

Much of the information assembled by this bureau is published promptly in the "Bulletin" or the "Reprint and Circular Series" of the National Research Council, but the purpose is to maintain complete up-to-date files in the general office of the Council.

Requests for information should be addressed, Research Information Service, National Research Council, 1701 Massachusetts avenue, Washington, D. C.

Slag Concrete Brick

Blast furnace slagg, formerly a waste product, has found a new and most serviceable as well as attractive use in the form of face brick and tile.

The Birmingham Slag company has completed at Ensley, Ala., the erection of a factory for the production of concrete brick and building tile composed of five-sixths furnace slag and one-sixth cement. The product is already on the market. It is called Slag Tex.

Both the brick and the tile take any color desired. The color is partly infused, as the cement and slag are being mixed in the molds, but the finishing color and texture is superimposed on the face.

About $50,000 was invested in the new plant at Ensley, where the large slag plant of the company is located adjacent to the Ensley blast furnaces, from which the raw material is secured.

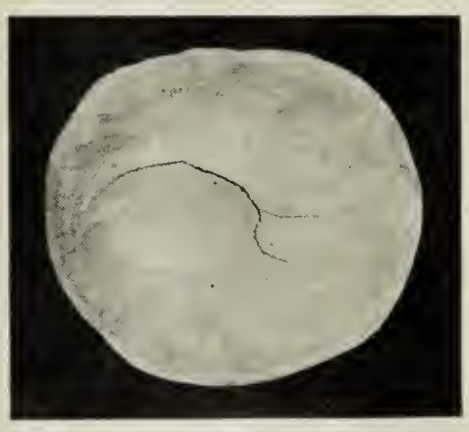
The product takes every hue and surface of the clay product, and is of unusual hardness and impenetrability by moisture.

Extraordinarily Good Quality of Portland Cement Produced

By J. L. GOFFETTE, C. E. Vancouver, B. C.

Referring to the article in the February issue of CEMENT AND ENGINEERING NEWS, entitled "Marque Speciale" Swiss Cement—a new portland cement with remarkable properties for developing early strength an investigation and tests of which were made by W. A. Brown & Pooley, Ltd., Consulting Engineers, 61 Chancery Lane, London, W. C., England, will say that in December, 1918, I made some tests in California on a commercial cement. The tensile strength of that cement was for 1 cement and 3 Ottawa sand, 220 lbs., after 7 days, and 285 lbs. for 28 days respectively.

Water used for the gauging 8.50 per cent; the same cement mixed with more water for the gauging quakey consistency or about same mixture as used in practice by contractors.



(For all test)—Tensile strength per square inch in open air, 88 to 102 degrees T. heat in shade.

Test No. A. Setting time—4.30 hours.	Neat Cement 1+6 days	Neat Cement 1+27 days	1 part Cement 3 parts Sand. 1+6 days	1 part Cement 3 parts Sand. 1+27 days	No.
Water used for gauging cement mixture 12 per cent.	221	308	140	212	1
Water used for gauging neat cement, 36 per cent.	281	215	175	185	2
	205	325	182	190	3
	245	280	160	162	4
Briquettes placed in water 24 hours after gauging. 7 briquettes broken due to shrinkage.	252	315	110	155	5
	Average lbs.		Average lbs.		
	240	288	153	180	

Pat made from Cement Portland same as No. A in paste state poured on glass. No troweling.

100 grammes of neat cement.

Water used for gauging, 36 per cent.

Setting time: 4½ hours.

Left in open air 24 hours after gauging.

Shrinkage and swelling has ruined the pat of that cement.

Chemical Analysis.

Silica	20.54
Alumina	6.80
Lime	60.00
Oxide of Iron	2.80
Magnesia	5.56
Alkalies	1.06
Sulphuric trioxide	1.95
Carbon dioxide	0.68
Water and loss	0.60

I take some clinker from same as used for the making of cement for Test No. A. without sulphate of calcium, but ground with some substance else.

That no gypsum cement gives a superior cement.

Test made in open air as for Test A.

Test No. B. Setting time—30 minutes.	Neat Cement 1+6 days	Neat Cement 1+27 days	1 part Cement 3 parts Sand. 1+6 days	1 part Cement 3 parts Sand. 1+27 days	No.
Water used for gauging same as for "A," 12 and 36 per cent, respectively. Briquettes placed in water 24 hours after gauging.	460	608	320	402	
	445	580	308	410	
	550	615	330	380	
	480	570	345	393	
	485	595	342	430	
All briquettes perfect, and placed in water 24 hours after gauging.	Average lbs.		Average lbs.		
	464	583	329	405	

Pat made from Cement Portland same as No. B. poured on glass in paste state. No troweling.

150 grammes of neat cement.

Water used for gauging, 36 per cent.

Setting time: 30 minutes.

Left in open air 24 hours after gauging.

Cracks none.

Swelling none; not only waterprof but absolutely impermeable.

No indication of expansion or contraction.

Photographed eight months after gauging.

A cement manufacturer called that a mysterious process. There is no mystery there. Cement manufacturers use sulphate of calcium for the regulation of setting time. We know that gypsum has a detrimental effect on hydraulic materials, so why not use a substance having no such detrimental result. Not introducing deleterious material in Portland Cement, does not constitute a mystery.

I have made more tests in that way. I got some clinker having the following chemical analysis:

Silica	22.36
Alumina	7.04
Lime	64.40
Oxide of Iron	3.80
Magnesia	1.84
Sulphuric anhydride, Alkalies, Carbonic anhydride, Water and loss	0.66

That clinker has been ground with the no gypsum process material, that no gypsum cement has the following tensile strength per square inch. Laboratory gauging 21 and 850 per cent of water used.

TEST NO. C.—Setting time, 30 minutes.

Neat Cement 1+6 days	Neat Cement 1+27 days	Neat Cement 1 year	No.	1 Cement, 3 Sand 1+6 days	1 Cement, 3 Sand 1+27 days	1 Cement, 3 Sand 1 year
780	910	1180	1	460	580	645
835	930	1110	2	480	620	735
840	990	1105	3	510	495	685
860	950	1065	4	515	630	710
830	920	1115	5	505	590	730
Average pounds				Average pounds		
829	940	1115		494	583	701

The same cement as Test No. C in quakey consistency. Water used 32 per cent for neat cement and 13 for cement mixture.

1+6 days	1+27 days	1 year	No.	1+6 days	1+27 days	1 year
660	750	...	1	420	515	...
645	720	...	2	405	535	...

705	770	...	3	390	495	...
670	730	...	4	410	530	...
685	765	...	5	445	485	...
Average pounds				Average pounds		
673	747	...		414	512	...

Briquettes showing void (air chamber holes), soundness gives no indication of either expansion or contraction; it shows a cement of remarkable quality.

I had in Los Angeles, Calif., 2 years ago, made a test on a commercial cement. The chemical composition was for Sulphuric Trioxide 1.80 and 3.30 for Carbon Dioxide.

Briquettes of neat cement after one year's exposure to atmospheric action were blown up in complete disintegration. The 1 cement and 3 sand were in good condition—no trace of disintegration visible. The tensile strength at 28 days was very high.

Consequently it is very hard to believe that the Swiss cement will keep its cohesive strength, with such a heavy proportion of sulphuric anhydride, (carbonic anhydride). The no gypsum cement will never give such trouble, and will give to the manufacturer the absolute control of the setting moment; from 5 minutes to 18 hours. The rapid setting has at 2 hours the same strength as the common cement has at 24 hours.

Expansion of volume: The cement tested No. A. poured in 2 inch glass tube has broken the tubes at 85 days of age. The cement tested No. C. after 16 months has shown no trace of being broken. I believe the possibility of the making of a slab 6 ft. x 6 ft. 5/8 of one inch thick, and coming up like the finest polished marble.

We can see, with the British Engineer, a new era in the Portland Cement industry has dawned, a new process has been discovered.

Big Output of Sand and Gravel

Figures Issued by United States Geological Survey Show Increase of 7 Million Tons Over Last Year.

Though many producers reported that their output had been curtailed from 10 to 30 per cent on account of inability to get railroad cars, the total quantity of sand and gravel produced in 1920 was nearly 78,000,000 tons, or about 7,000,000 tons more than in 1919. The total value increased from about $46,000,000 to more than $62,000,000. The production of building sand increased nearly 4,000,000 tons, and the average price per ton the country over rose from 56 to 66 cents. The output of molding sand increased more than 1,000.000 tons and the value more than $3,000,000. Glass sand, which is rather high priced, rose from an average of $1.97 a ton in 1919 to $2.20. The following table includes preliminary estimates for 1920 made by L. M. Beach, United States Geological Survey, Department of the Interior.

Year.	Glass sand.		Molding sand.		Building sand.	
	Quantity (short tons).	Value.	Quantity (short tons.)	Value.	Quantity (short tons.)	Value.
1918.....	2,172,887	$4,209,728	4,910,178	$5,121,865	19,686,885	$ 9,772,556
1919.....	1,827,409	3,593,371	3,774,612	4,153,990	21,969,736	12,296,664
1920.....	2,144,000	4,722,000	4,890,000	7,473,000	25,943,000	17,052,000

Year.	Other sand.		Gravel.		Total.	
	Quantity (short tons.)	Value.	Quantity (short tons.)	Value.	Quantity (short tons.)	Value.
1918.....	6,349,870	$5,259,620	28,704,606	$13,563,310	61,824,426	$37,927,079
1919.....	8,397,979	6,345,654	34,606,671	19,561,877	70,576,407	45,951,556
1920.....	9,361,000	8,546,000	35,549,000	24,901,000	77,887,000	62,694,000

Time Saving Concrete Forms

The Reichert Metal Concrete Forms Company, 1188 Weil street, Milwaukee, Wis., with fourteen years of metal forms manufacturing experience have recently added new improvments to their forms.

The All Steel Locking Device, save times, saves excavation and holds the forms firmly and closely, preventing spreading or breaking apart of units. The Reichert Steel Lock operates easier and fits snug against the wall of the unit thus preventing breaking or injury like those that project.

All angles are of mild steel 1¼x1¼x⅛ rivited to the four sides of the sheet and a center angle which acts as a stiffener making a very rigid mold.

In the angles on the top of the mold are holes through which spikes are placed going through the holes in the spreaders which give the desired thickness of the wall. Two, three or four courses of molds can be set up and poured at one time. If two or more courses are poured at one setting the spacer is removed as soon as the concrete is poured, the wire which also ties the molds holding them in shape. Each plate is further provided with three clamps made of soft steel stamped to shape. These clamps are riveted securely to each unit two on the side of the right upright angle and one on the lower horizontal angle which is to lock the forms top to bottom. When not in use the locks hang downward out of the way, and in no danger of being broken off when the plate is thrown around and moved from one job to another.

When the molds are locked together the clamps pass through the slots in the angle of the next (form) mold locking them securely together and at the same time lining them up. Therefore the plates cannot shear at the junction of two plates because the clamps which hold them (top) pass through the angles and prevent shearing and spreading.

Copies of their latest circular will be mailed to interested parties on request.

Advantages of Dragline Cableways

A complete treatise on a big subject presented in a form that is easy to read, is clearly described in Pamphlet No. 14, recently issued by Sauerman Bros., 1139 Monadnock Block, Chicago.

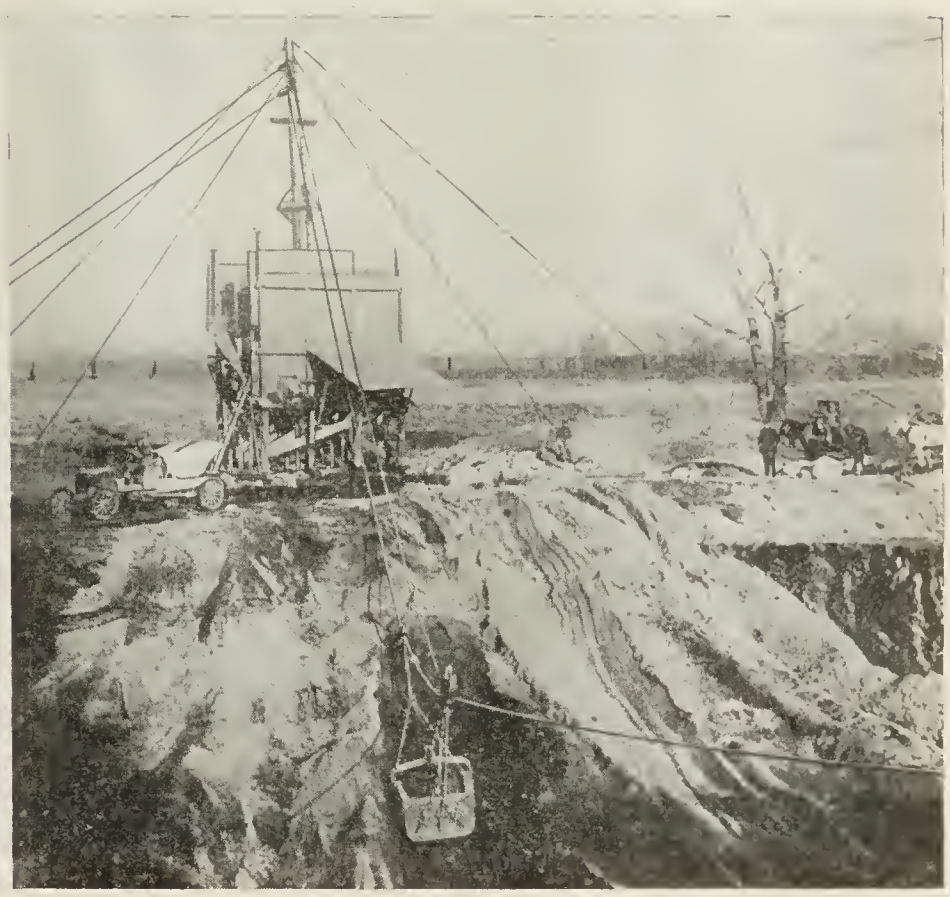
In 14 pages of text, photographs and diagrams the whole subject of the advantages and uses of Sauerman Dragline Cableway Excavators in connection with sand and gravel plants is covered in a manner that convinces and leaves few, if any, questions to be asked.

Incidently, the pamphlet gives the reader a lasting impression of the important part played by dragline cableway excavators in bringing about more intensive and profitable development of the sand and gravel deposits of the United States.

put of a standard unit, such as brick, rather than going in for a number of diversified products.

Marbletone Stucco

"Marbletone - Stucco" manufactured by the Independent Gravel Co., Joplin, Mo., is a true portland cement stucco long past the experimental stage. It is the product of a carefully selected and scientifically graded aggregate, thoroughly mixed by machinery, with the best quality of white portland cement, and those ingredients that time and experience have shown necessary and adaped to "Workability" and permanance. Being white in color, it makes possible the securing of any desired color tone or tint by the use of proper mineral pigments, or by the use of colored stone. Uniform coloring is assured. Color tones secured by the use of mineral pigments are permanent in Marbletone because the aggregate used is of a granular nature with a rough surface. Each and every particle therefore becomes colored, and the color tones are permanent. Complete information may be obtained from the company.



Two views of Sauerman Dragline Cableway Excavators. One shows a 1½ cu. yd. outfit excavating gravel from under water, the other depicts a dry pit operation with a 1½ cu. yd. equipment. These illustrations reproduced from a new pamphlet just published by Sauerman Bros., Chicago.

Concrete Brick

The Decorative Brick Co., Seattle, Wash., recently took over the business of the Seattle Shope Brick Co., and has been producing concrete brick 2x4x8, with what is reported to be a high moisture resistance and a tensile strength of from 2,000 to 3,500 lbs. per sq. in.

The plant is equipped with five hand-tamp machines, capable of producing 2,000 common brick, or 1,500 face brick per shift. The new owners find a strong prejudice against concrete brick, on the part of the architects, and only a lukewarm appreciation of its merits by contractors in that market. Due to only partial activity in the building field, the present market is down.

The Decorative Brick Co., with five machine operators, one mixer, one helper and a foreman, has a capacity for 7,500 face brick, or 10,000 common brick per day. The company expects to put in a steam curing room, but so far is curing its products in sheds. The company proposes to confine itself to volume out-

Reinforcement of Concrete Highways

"Reinforced vs. Plain Concrete Highways" is the title of a 15-page booklet by H. Eltinge Breed, A. S. C. E., consulting engineer, New York City, copies of which may be obtained from the National Steel Fabric Co., First National Bank Building, Pittsburgh, Pa. Mr. Breed considers in extenso steel reinforcement of concrete pavements, which, he says, tends to lessen cracking and to render more innocuous those cracks which do occur. Moreover, it tends to prolong the life of the pavement by relieving the fatigue due to tensile stresses. The publication contains an abundance of information of value to engineers.

Crushing Stone for Texas Roads

To provide Texas with good roads is almost a nation-size undertaking. This would be true normally, for Texas is a state "of magnificent distances," larger than France, nearly as large as Norway and Sweden combined.

It is especially true since the discovery of oil, which has developed portions of Texas very rapidly and over-taxed all existing highways. When a hamlet of 800 people, as Ranger was in 1917, grows in three years into a city of 20,000, the road traffic is certain to outrun road facilities. Within 25 miles of Ranger today, there are from 3,000 to 5,000 producing wells, not to mention the dry wells, and the boring of each well required the hauling of ten car loads of material over very uncertain roads.

All this has created a great demand for crushed stone and has inspired the development of a half dozen quarries in a state where stone and gravel ordinarily are as scarce as hen's teeth. One of the largest of these quarry operations, if not the largest, is that of the Thurber Earthen Products Company, at Tiffin, a few miles east of Ranger. The development of this project seems unquestionably a byproduct of the oil boom. The ledge of stone which is being quarried is owned by Mr. Hagaman, mayor of Ranger, and has been leased to the Thuber Earthen Products Company, who have enough rock available to run the plant to full capacity, 150 tons an hour, during the next 34 years. This ledge is 22 feet thick, with only ten inches of overburden. The rock is high class limestone and greatly in demand.

The plant at Tiffin is comparatively new and is up to date in every particular. It cost a half million dollars. No human hand touches the stone from the time that it is taken from its native ledge until delivered to the purchaser for road surfacing, railroad ballasting or concrete work.

The ledge is drilled with Sullivan tripod steam-driven drills. After shooting, the material is loaded by steamshovel into Western six-yard standard-gauge dump cars. Two steam shovels are used in this work. Dump car trains carry the material to the crushing plant, where it is dumped into a Gates 48x60-inch crusher. The haul from the steamshovels to the crusher was about 900 feet in December, when the photographs were taken. The maximum haul will be 1,500 feet.

After passing through this primary crusher, the stone is carried to two No. 6 Gates gyratories, the rejects passing through a No. 5 gyratory of the same type. The stone then passes to the screen house and from the screens into bins, the finished product ranging in size from 3½-inch to $\frac{3}{16}$-inch stone.

From these bins the material is loaded by gravity into open-top railroad cars, when such cars are obtainable, for delivery to the purchaser. The dust, from ⅛-inch stone down, is finding no market at present, although excellent for surfacing roads and for farm fertilizer. This byproduct is loaded at the bins into the Western 6-yard cars and dumped in storage piles, there to remain until a market develops. There are nine very substantially built bins, which contains 152,000 feet of lumber, not including the superstructure.

The entire plant is electrically driven, from the company's own power house, equipped with a 625 K. V. A. Allis-Chalmers turbine. Water is obtained from "Hagaman Lake," a reservoir formed by damming Bull creek for the water supply of Ranger.

The general office of the Thurber Earthen Products

General View of crushed stone plant of Thurber

View showing method of handling fine material at the bins. This material is taken to a storage pile and dumped, there being no present market for it

Close-up view of crusher, showing method of unloading stone. A 6-yard dump car is discharging its load into the crusher-bin.

Company is at Thurber, Texas. The concern is one of several subsidiary companies operated by the Texas-Pacific Coal and Oil Company, whose executive offices are at 24 Broad street, New York. J. R. Penn of New

Earthen Products Company, Tiffin, Texas

York is president of the Thurber Earthen Products Company; William J. Ochiltree of Thurber, Texas, is general manager. C. A. Dakin is general superintendent of the plant at Tiffin, occupying, with his wife, a neat lettle cottage, not far from his office.

The dump at Tiffin. The train of Western 6-yard cars has just dumped the fine material taken from the bins.

Concrete in Sea Water

In an experimental investigation conducted by the Aberthaw Construction Company, of Boston, twenty-four large concrete specimens were exposed for 12 years to the alternate action of sea water, atmosphere and frost to determine whether it is possible to make concrete that will completely resist the above conditions.

There were made in the Boston Navy Yard twenty-four 16x16-inch specimens 16 feet long without other reinforcement than a ⅝-inch full length twisted steel lifting rod. In the top of each specimen there was bored a 2½-inch hole 8 feet long that was closed with a screwed cap.

The specimens were made of concrete proportioned 1:1:2, 1:2:4 and 1:3:6, with eight different brands of Portland cement, trap rock broken to pass a 1¼-inch ring and having the dust screened out, and fine sharp sand with about 4.6 per cent moisture.

The concrete was machine mixed dry, plastic, and very wet, in different specimens, was poured in horizontal forms and after five weeks' seasoning was suspended under a pier in such manner that the lower ends of the specimens were always submerged and the upper ends were always above water level. After several months the holes in seven of the specimens were found dry and the remainder contained from 16 to 65 inches of water.

From time to time the specimens were inspected, photographs made, and their conditions recorded. At the end of 12 years five of the specimens, "showed little or no effect from their immersion." Of the remainder, one specimen was entirely destroyed and disappeared in the center part, another was half destroyed and disappeared and the remainder were more or less injured, decayed diisntegrated or reduced in size. The test and results are carefully described in a handsome report published by the Aberthaw Company and illustrated with two photographs of each specimen, one taken about 5 years after the test was commenced and one taken after its termination.

The report also includes tests of the neat cement and of the cement mixed with hydrated lime and with pulverized clay and analyses and tests of the stone and sand.

Reinforced Concrete Construction Without the Use of Forms

By C. W. DONALDSON.*

By the use of this system a monolithic reinforced concrete structure is erected entirely without the use of forms, a ribbed expanded metal lath being used as the form at the same time producing excellent reinforcement. The system produces a column and beam structure with a dead air space between the inner and the outer walls. The exterior and interior columns, floor slab, floor beams and roof, are all poured concrete, the metal lath constituting the forms. The lath for floor slab is erected over temporary wood posts and stringers spaced about three feet on centers, the ribs of the lath providing sufficient rigidity while concrete is being poured.

By the use of metal lath in place of wood or steel forms, a much more flexible system is obtained. Curved surfaces, coved corners and similar details are made possible at low cost because of the flexibility of the lath—the same details in rigid forms of wood or steel would be much more troublesome and costly.

The roof is formed in the same manner as the floors and may be any style or shape desired. Roof beams and overlying slab are a monolith and where desired for a for a long span, roof trusses may be formed in the same manner. Where additional reinforcement is required, same is placed in the usual manner in columns, beams and floor clab.

Another unique feature of this system is the use of the rib-mesh in stair work. The mesh is bent to the shape desired, tied in place securely and coated both sides with about two inches of cement mortar—stringers being formed of the same material. This gives excellently reinforced concrete steps without the use of forms. Stairs built in this manner may have additional reinforcements as required for longer spans or heavier loads.

A ten-family apartment house built for Avondale Mills, Birmingham, with the Donaldson System.

Exterior Wall.

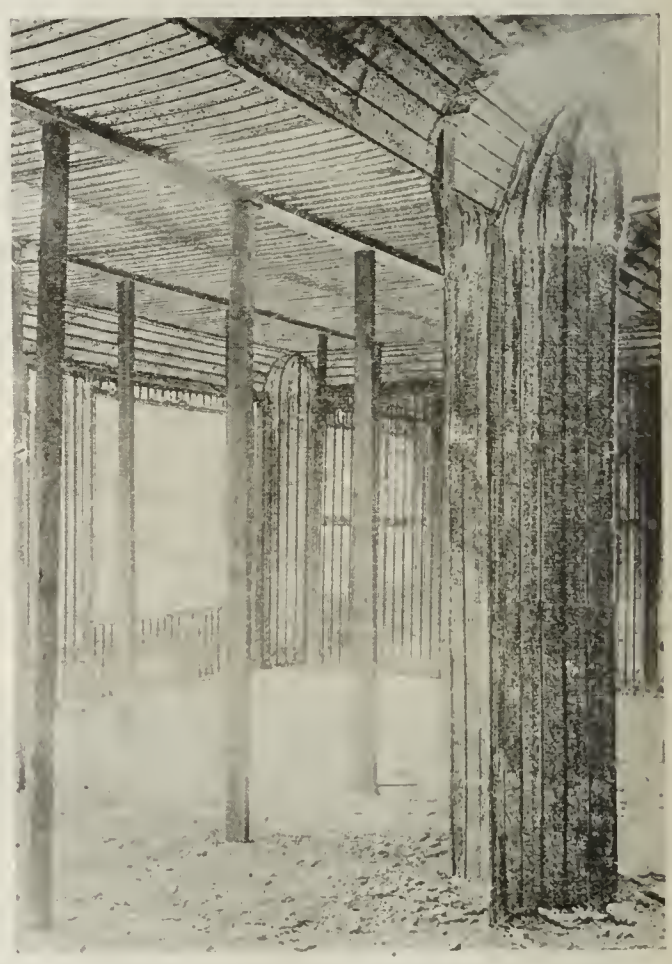
The complete building framework—column, beams, floor and roof slab—are poured in the same manner one pours a building when employing ordinary wooden forms. A 1:2:4 mix is used of the usual consistency, and there is no loss whatever of cement or concrete, just enough oozing through the mesh to completely imbed same and to develop to full strength the steel in tension. The exterior mesh constituting the outer form for the beams and columns, has been placed so that the ribs are turned to the inside of the building, and is now ready for application of cement plaster that will form the exterior wall. This plaster is a 1:3 mix of coarse sand with 10% hydrated lime. A scratch coat is applied over the whole of the outer surface; this is followed with a brown coat, bringing the same flush with the grounds around window bucks and door openings.

The inside face of the lath is now back plastered and the inside lath is erected 3 in. from outer mesh, being fastened to beam bottom and channels at floor line, thus allowing a 3-in. dead air space between inner and outer wall and extending from column to column and from beam to floor line. This inner lath is then plastered with a scratch, brown and finish coat, the poured concrete in columns, beams and floor slab having oozed through the mesh forms an excellent key for the finish plaster coat. Thus we have the mesh acting as a form, a reinforcement and a lath all at the same time. The excellence of this method of reinforcement in floor slabs is proven by the following test conducted by the City building department of Birmingham, Alabama:

"Tests on two slab 16 ft. x 14 ft. clear span, the T-beam having a 15 in. cove using a 3½ in. concrete slab with 24 gauge rib expanded metal lath as the only reinforcement, were as follows:

Live load, 120 lbs. per sq. ft.
Dead load, 50 lbs. per sq. ft.

Deflection at end of loading, one slab 3/64ths of an inch, the other 1/32nd of an inch. At the end of 24 hours this deflection remained constant, that is, 1/32 and 3/64. Upon load being removed floor moved up to original position."



View of interior of building showing columns and floor slabs, poured, but walls not yet plastered.

Exterior Finish.

Window and door frames are now set back of outside casings, being bevelled inward against wall for

about ½ in., frames are nailed in place to rough buck around openings and any of the beautiful stucco finishes applied in the usual manner.

Floors may be colored to suit, being composed of a cement, sand, saw-dust mix developed by the inventor of this system and in use for over two years with excellent results.

The outstanding and important points in this new method of concrete construction as follows:

Economy—The cost of an ordinary outside wall of frame per surface foot with common lumber at $50 per M and siding at $100 is 37½c., divided as follows:

Sheathing, studding and common labor	$0.10	per surface foot
Siding	.12½	per surface foot
Painting	.04	per surface foot
Carpenter labor for framing, sheating and siding	.11	per surface foot

Exterior view. Columns and floor slabs poured. Exterior lath ready for plaster.

With Donaldson System the total cost is 29c per surface foot, divided as follows:

⅜ rib mesh erected	0$.09	per surface foot
Plastering material and labor, including concrete, in columns and beams	.20	per surface foot
Total wall cost	.29	per surface foot

Maintenance and Upkeep—Practical elimination for all time of any expense whatever for maintenance of any kind. A sanitary and fireproof building which is also the most economical to heat.

*Donaldson Construction Co., Chicago.

New Patented Forms

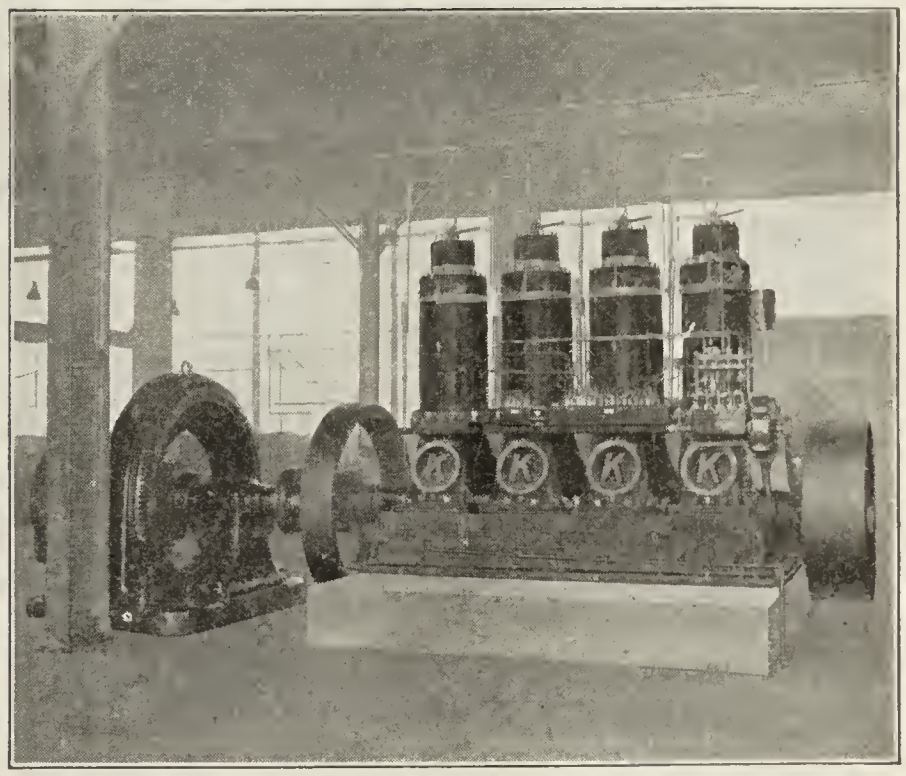
F. S. Hart & Son, 99 North street, Batavia, N. Y., have patented and will place on the market the Cruci-Form Interlocking Units, which, when applied to the casting of brick, block, tile or stubs, enables one to hold a wall permanent and durable with or without mortar. They are also inventors of the Arcuated Building Stave with doube-off set hoop bearing, designed for light, medium and heavy types of circular buildings.

Plants are being erected in several cities in California, Washington and Oregon to manufacture the Sawyer System of hollow wall construction. This system invented by F. McM. Sawyer, Los Angeles, Calif., consits essentially of a two-piece self-locking sectional wall, practically monolithic without the use of wooden forms.

Engines That Solve Your Power Problem

The type "K" Anderson is truly the most wonderful prime mover of the age. Designed in the light of past experience by practical oil engine men to embody the conclusions of the world's best talent, thus giving a flexibility, clean combustion and economy not heretofore attained. It has the ability to run well on light loads; rotate in either direction or drive from either side; operate with or without water in the mixture and burn heavy fuel with little to no smoke.

It does not mater what you need power for, Anderson Type "K" is the best power for operating pumps, screens, crushers, washing equipment and block and tile machines. They are made in 2, 3 and 4 cylinder sizes, 15, 20, 25, 30, 40, 45, 60, 80, 90, 120, 135, 180 and 225 H. P., also made in 1 cylinder type H. 25 H. P., and one cylinder 20 H. P. By greatly improved design Anderson Engines present simplicity of outline, possess maximum strength and afford an ease of access to

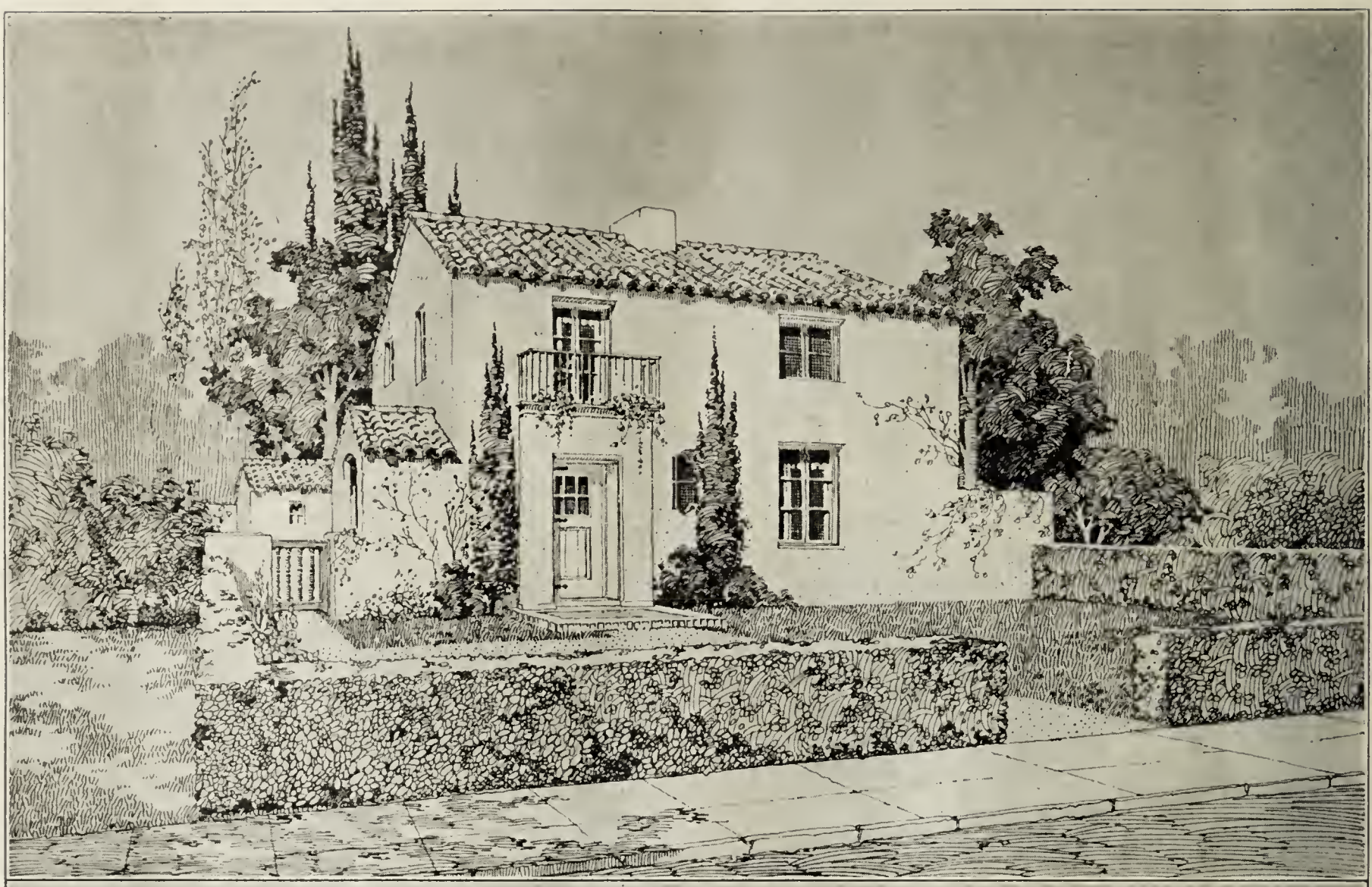


working parts not approached in other types. The manufacturer recommends them as the most economical solution of your power plant problem, they burn the cheapest oil, very quiet in operation, no overhanging parts, and truly a balanced engine. Compared to a full Diesel Engine, they may consume slightly more fuel, but will take so much less of everything else that when the total operating expenses are compiled at the end of the season's run they will show a greater overall efficiency.

The manufacturers of this wonderful oil engine, the Anderson Foundry & Machine Co., Anderson, Ind., was founded in 1872 and they now have the largest and best equipped factory in America devoted exclusively to producing semi-Diesel oil engines. The first Anderson oil engine was put into service twelve years ago, when oil engines were yet in their infancy, consequently the Anderson can be rightly adjudged a pioneer in its line.

For Stucco Finishing

The Kampeska Materials Co., Sioux Falls, S. D., have equipped their quarry for the production of the smaller sizes of crushed quartzite for stucco finishing. The material is of reddish tan and free from rust-producing minerals.

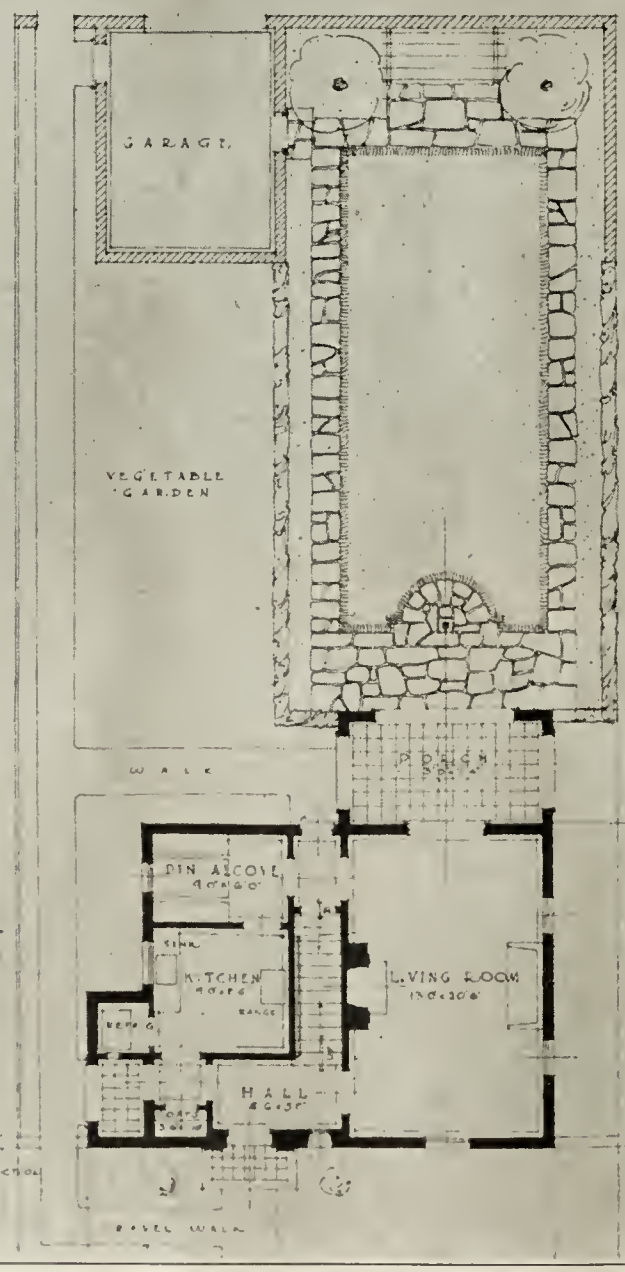


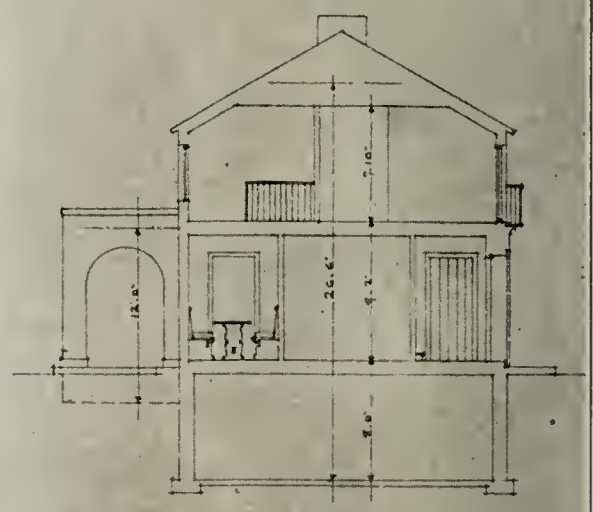
CUBIC CONTENTS

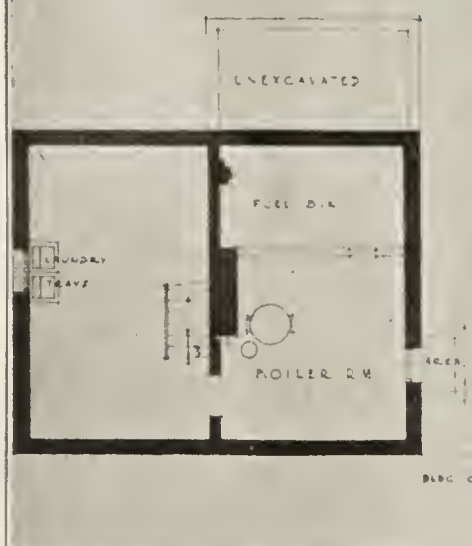
HOUSE 27'-6"x22'-0"x26'-6" =	16032
REAR PORCH 14'-0"x8'-0"x 12" =	672
SIDE PORCH 4'-0"x11'-0"x 12" =	264
TOTAL . . .	16968

NOTES

EXTERIOR STUCCO TO BE FINISHED SMOOTH COLORED WHITE. EXTERIOR WOODWORK PAINTED A LIGHT GRAY-BLUE IRON WORK PAINTED BLACK. ROOF TO BE OF RED MISSION TILE MECHANICAL UNIFORMITY TO BE AVOIDED IN WALL AND ROOF. □







Home-Building Means Character Building

An all-round home, with the privacy that it gives, plus a yard and garden for recreation and exercise mean much in the way of individuality and general development. Aside from the enjoyment, which after all is what one has a right to expect, there are elements of thrift entering into the proposition of home-building and ownership which makes the man or woman who owns a home recognized in the business world as responsible and steady-going—other things being equal—as against the sort of person who is content to flit from flat to flat and in the end own nothing.

It takes something like the present renting problem to awaken the average flat-dweller to the fact that by making a deposit of $50 a month with interest he would in five years be in possession of more than $3,000. With this sum, or even less, he could begin to build, and enter into possession of a real home and place to bring up his children in a natural way, while he himself would have a better standing as an employe and a citizen.

One of the expenses involved in building a home which shall be individual and artistic in character, is the service of a good architect. By a beneficent arrangement intended to assist people in their building plans at this time, a nation-wide competition has been held between architects, known as the "Small House Competition." Awards were made by a jury of architects, the designs receiving the awards being published in book form under the auspices of the Own a Home Exposition, Inc., in Chicago. Plans and specifications for any one of the houses selected are furnished for $25. By courtesy of the publishers of this book we are enabled to reproduce one of the design this month,—the first award in the stucco class, designed by Mr. Louis Justement, of Washington, D. C.

The type of this house reminds one somewhat of the villas, with their white walls and red roofs, which one sees nestling in the green of their gardens in the smaller towns and suburbs of cities all over France, Italy and Spain, and which remain in the mind of the traveler as one of the pleasantest features of the landscape.

This particular "villa" is designed to be practical in any climate by reason of the roomy fuel bin, and heating arrangements in the basement, augmented by the large open fireplace in the living room and larger bedroom. The plans include electric lighting and a well-appointed bathroom. A pleasing feature of the design calculated to insure coolness in summer, is the spacious living room, with its French windows opening on the street and its French doors at the rear opening on a porch which in turn overlooks the garden.

Directly across the hall at the rear of the house is the "dining alcove"—an innovation having a built-in table and benches. By extending the rear wall four feet further, this could be made into a 9x10 room which would accommodate a regular dining table and chairs, not to mention a larger family.

The kitchen in this house—which is to be servantless—is conveniently placed midway between the front, side, and rear doors, enabling the young housewife to play parlor maid or kitchen maid as occasion may require. The range is placed on the inner wall, the sink under the window, and the refrigerator in its enclosure accessible to the iceman from the side porch and from the kitchen, with few steps. A built-in kitchen cabinet and an adjustable ironing board can all be added to the conveniences of the household by a competent contractor.

Passing through the front hall, with its handy coat-closet, and ascending the stairs, we find that the rear hall leads to the two bedrooms and the bath and contains a linen closet. The larger of the two bedrooms has a double window in front, two on the side, and opens at the rear onto a "deck"—the roof of the back porch. It has also a fireplace and window seats, and repeats in its proportions the design of the living room below. The smaller bedroom opens with French doors upon the flower-decked balcony over the front door, and has a window above the side entrance.

This house has been actually erected in one of Chicago's leading furniture stores. For the convenience of our readers we give here an approximate estimate on its cost if completed with basement, heating, lighting, etc. According to the contractor's esimate the cost in Chicago or in its suburbs would be between $8,000 and $8,500. This estimate is based on the following specifications:

Mission tile roof; wood studded walls covered with two coats of stucco on metal lath (hollow tile would add about $500); fir wood trim in any finish; yellow pine quarter-sawed flooring (oak would add $75 or $100); plastered walls; brick-faced fireplaces; electric wires installed; modern heating and plumbing.

If anyone preferred brick to stucco, the general effect could be preserved by using a wire-cut brick in a white or cream with mortar of the same color. The added cost would be about $800.

News Items

Peace Co., Ltd., Marmora, Ont., Canada, have an excellent limestone deposit, containing over 100,000,000 tons suitable for building, road, lime, flux ballast, carbide, etc. They would be pleased to negotiate with parties with a view to operation on a large scale.

William R. Elden has joined the organization of Sauerman Bros., Chicago, as engineer in charge of designing and specifying power equipment for Sauerman dragline cableway excavators and Sauerman power scrapers. Mr. Elden is well qualified for his new duties through fourteen years' experience as sales engineer for the Lidgerwod Manufacturing company, manufacturers of hoisting engines. He is a graduate of Purdue University and a member of the Western Society of Engineers.

W. J. Nast and H. A. Nast, secretary and treasurer respectively of the Nast Bros. Lime and Stone company, Marblehead, Wis., which was recently absorbed by the Western Lime and Cement company, Milwaukee, Wis., have been elected to the board of directors of the new company.

Sand and Gravel Washing

Catalogue No. 440, recently issued by the Link-Belt Co., 910 South Michigan Ave., Chicago, describes in an interesting manner various plants that have been constructed for the preparation of sand and gravel. This catalogue contains 96 pages, 6 by 9 in., printed in two colors on coated paper and profusely illustrated. There is a serviceable stiff-board cover, attractively embossed. Descriptive of Link-Belt elevating and conveying machinery and special equipment for screening, washing and handling sand and gravel, including the Dull system of inclined conical washing and sizing screens, sand separators, slack line cableway excavators, bin gates and spouts.

New Application of Small Compressed Air Drills

The view below shows the quarry of the Wharton Steel Co., Wharton, N. J., after a recent blast. All the drilling for this blast was accomplished with Sullivan hand hammer drills.

The quarry face is about 20 ft. deep and the powerful type of hand hammer compressed-air drill used is claimed to operate at this depth satisfactorily and to be capable of drilling 250 ft. of hole per day.

The holes were drilled on from 5 to 6-ft centers, which gives a good distribution of the explosive, and, it is claimed, results in the rock being broken up into smaller chunks, requiring less plug drilling or mud capping. It is also claimed that the new method scatters the stone less and makes it possible to get closer to the face with the loading track, but view herewith does not seem to prove this.

For loading at this quarry a caterpillar mounted shovel is used. The same shovel is used for stripping. The ease with which this shovel can be moved anywhere has made it possible to use it in a number of instances as a locomotive crane in moving heavy pieces of equipment.

Blast from holes made with Sullivan hand hammer compressed-air drills.

Steam Shovel on New Mounting

The Osgood Company, manufacturers of excavating machinery, Marion, Ohio, have lately brought out the Osgood No. 29, one yard, traction revolving steam shovel with continuous tread trucks, an improvement that was recently perfected. This announcement will be of especial interest to contractors, for the new mounting enables the machine to travel over very soft or uneven ground easily. As the tread belts extend only a little beyond the truck frame they interfere as little as possible with the operation of the dipper. Either side can be easily and quickly adjusted independently of the other side. Quality, rigidity, and compactness, conspicuous features of products of this make, are retained in this new development, which is so built that it may be equipped with steel boom, extra drums, etc., for converting it into a crane, a clamshell or a dragline outfit. It is designed and constructed throughout to meet requirements of actual working conditions.

R. F. Weston, superintendent, left the Penna. Cement Co. New York plant.

The Kent Motor Drive

No. 2 STATIONARY CONCRETE MIXER

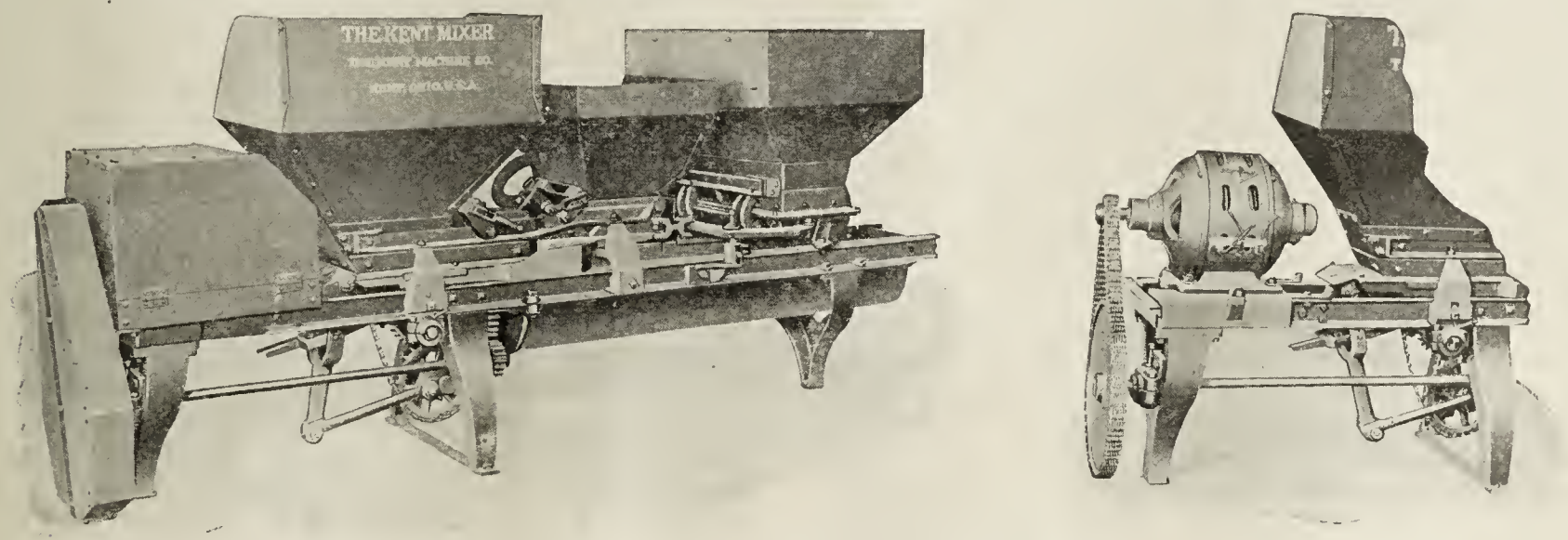
The Ideal Mixer for Concrete Products Plants

Capacity 5 Cubic Yards Per Hour

The Kent Machine Co., Kent., Ohio, are sending out a very attractive circular describing their new motor driven stationary mixer.

The Kent Mixer was designed for use in Concrete Products Plants and meets the requirements for this work to an extent not equalled by any other mixer on the market. It reduces labor costs to the minimum and turns out the accurately proportioned, uniformly mixed and moistened concrete which is so necessary in the manufacture of quality products. Mixing with a Kent always gives a product uniform in color and quality.

The No. 2 three hopper machine is equipped with motor and silent chain drive. The rated capacity of this machine is 5 cu. yds. of mixed concrete per hour. With the exception of the motor drive attachment it is the same as the belt driven mixers which the Kent Co. have been manufacturing since 1907, a complete description of which is given in their Catalog No. 11. This catalog also describes in detail how the "Kent" automatically does its own measuring, mixing and discharging without the use of man labor. The design of the hoppers, patented feed plate, regulating gates, mixing shaft, etc., is also clearly shown in this catalog.



View showing a No. 2 Three Hopper Mixer with a Capacity of 5 cubic yards per hour, equipped with a 3 H. P. Motor and Silent Chain Drive

In plants where power is furnished by gas, gasoline or steam engine, a belt driven Kent Mixer should be used, but in plants where electric power is available they recommend their unit drive machines. A mixer with power attached reduces operating costs materially as all belts, pulleys, shafts, etc., which are necessary when using belt driven machines are eliminated, and the power used in driving this unnecessary equipment is saved. Also power is only being used during the process of mixing.

Under ordinary operating conditions 2½ h. p. is sufficient to operate this machine, but in order to provide for a possible overload a 3 h. p., 1,200 r. p. m., either direct or alternating current, motor is used. This extra power prevents any possibility of damaging the motor through overloading the mixer. In ordering a mixer equipped with motor drive customers must specify the kind of current used.

A silent chain drive is used in the speed reduction between the motor and the main drive shaft of the mixer because it has been demonstrated to be one of the most efficient mediums known for the transmission of power. The chain is made of the highest grade steel, heat treated and hardened to give it the longest wearing qualities possible.

This mixer is built with two or three hoppers and equipped with a 3 h. p., either direct or alternating current, motor. The length of the two hopper machine is 9 ft. 9 in., width 36 in., height 40 in., weight 1,200 lbs. The three hopper mixer is 10 ft. 3 in. long, 36 in. wide, 40 in. high, and weighs 1,350 lbs.

Concrete Barges on New York Canals

In his annual report on the Inland Waterways Service, General F. T. Hines devotes a paragraph to the concrete barges which were built for the New York State Canals. He says that experience with them has shown that they require but a fraction of the steel needed for steel barges, and that under favorable circumstances they can be put into water within four or five weeks. Further than this, however, they are of but limited value from an operating point of view. While the maintenance costs of the concrete barges on the New York Canal are lower than the maintenance costs of steel barges, this advantage is more than offset by their greater susceptibility to damage from collision. These barges have an excessive yawning depth, even when light, 2 ft. more than steel barges. They are unwieldly to handle, navigate badly and have a tendency for yawning toward shore with the tides and endanger the tow formation. On the whole the experience of the government with concrete barges has indicated that under normal conditions they are not superior to steel.

Colored Marble Chips

The Virginia Marble & Onyx Company is now ready to make shipments of various colored marble aggregates for concrete block facing and stucco work from its quarries at Salt Petre, Va. These are in white, black, rose pink, green and other desirable colors.

Does Hydrated Lime Weaken Concrete? Abram's Tests Discussed Pro and Con

Sir—Prof. Duff A. Abrams of Lewis Institute has rendered a real service to the concrete world through his long series of tests to determine the effect of hydrated lime and other powdered admixtures in concrete. He broke 20,000 specimens, which is far and away, the greatest undertaking ever attempted in this line. This makes it especially a pity that the conclusions which Prof. Abrams draws in his paper before the last meeting of the American Society for Testing Materials, are at variance with his figures. In a very proper effort to be thorough in covering the field he has investigated ranges of all the variables, far outside of practical limits. No one can disagree with this, but when the attempt is made to establish straight-line relations by the use of these figures, or to average them in with practical ranges, or to say that because extreme amounts of lime are injurious small amounts will be also, it becomes necessary to refer the public, to the figures themselves. Let us quote some of the conclusions drawn from the paper and indicate wherein they are not substantiated.

Conclusion 1—"In general the addition of powdered materials reduced the strength of concrete approximately in proportion to the quantity of admixture. Some exceptions are noted below."

Here all the specimens have been averaged together whether they contain small amounts of lime or 50 per cent, and the statement is made that the "relation is a straight line;" but many of the curves reveal the vital fact that small amounts increase the strength, even though larger ones reduce it. This is so evident in one figure after another that more study of the usual amounts of lime used seems to be necessary. Practically one-half of the curves and tables referring to compressive strength display points and figures higher than the corresponding plain specimens. These are mostly within the maximum percentages used in practice as follows:

Concrete	Hydrated Lime Per Sack Cement	Proportion By Volume
1:3 :6	12 lb.	30 per cent
1:2½:5	10 lb.	25 per cent
1:2 :4	8 lb.	20 per cent
1:1½:3	5 lb.	12½ per cent

(For waterproofing purposes, 15, 12, 10, and 17 pounds respectively.)

Conclusion 2—"In usual concrete mixtures, each 1 per cent of hydrated lime (in terms of the volume of cement) reduced the compressive strength 0.5 per cent."

Mixtures 1:1½:3 and 1:2:4 are the only ones considered here as usual mixtures, and 1:2½:5 is completely ignored although an enormous yardage of it is placed every year. Readers who examine the figures and tables will see for themselves that there is a region wherein lime increases the strength of concrete and a very much larger one where the laboratory losses in strength are more than overcome by the advantages. The qualities attributed to lime in concrete which account for its rapid progress of late years are not increased strength as hinted at by the author but prevention of segregation, easier flow in chutes and around reinforcement, reduction of honey-combing, smoother surfaces and watertightness. Throughout the paper it is assumed that immediately we begin adding lime we begin reducing the strength, in other words, "the relation is a straight line." The plotted points and figures, however, do not sustain this claim, as can be clearly seen when the curves are not drawn "by eye" as in the paper, but by some mathematical method. For instance, in Fig. 2 only two exceptions and eleven cases of increased strength within the limits; in Table VII, of 18 groups of tests only three failed to show increases of strength with lime; in Fig. 1 three-fourths of the curves show no considerable decrease within the limits; and particularly the summary in Fig. 1 in which all of the so-called straight-line curves are below the 5 and 10 per cent points and where within the usual limits no case of decreased strength is shown.

Conclusion 4—"The addition of 1 per cent of the following powdered admixtures in terms of the volume of cement reduced the strength of 1:4 concrete at 28 days by the following percentages: hydrated lime . . . 0.56 . . ."

But 1 per cent of lime was was not added at any point in the tests, and this is one of the many places where mistaken impressions are conveyed. Futhermore, all specimens have been averaged together by the straight-line method referred to above, which conceals the effect of small quantities of lime. It is a coincidence that 28 days is the age which makes the worst show for lime, and it is unfortunate also that 1:4 concrete is given so much prominence when only five pounds of hydrate per bag of cement is used in practice. Table XV shows very clearly that further study of small amounts of admixture is necessary. Here 1 and 2 per cent of mica, pitch, gypsum and ironite are added to the concrete and substantial increases in strength are shown, even though larger amounts do decrease the strength.

Conclusion 6—"Rich concrete mixes showed a greater loss in strength due to powdered admixtures than the leaner ones. In lean mixes (1:9 to 1:6) and those with aggregates graded too course for the quantity of cement used, the strength was little affected or was slightly increased by admixtures up to 50 per cent."

Under lean mixes, 1:2½:5 is included, and once more attention is called to the large yardage placed every year, in which even with large amounts of lime it is admitted that strength is increased.

Conclusion 7—"The wetter mixes showed a greater loss in strength than the dry, due to the addition of hydrated lime." Water is usually added in these wet batches for the sake of improved plasticity. Table XVI shows very decided improvement in the plasticity when lime is added, and indicates that it is unnecessary to use so much water in the lime batches in order to secure equal plasticity. This being the case, it is only fair to credit lime with a portion of the increased strength of the drier batches. Fig. 7, for instance, shows that 50 per cent of lime increases the strength up to 75 per cent, if no water is added, and this increase should be divided between the effect of the lime and the effect of the dryness.

Conclusion 10—"Hydrated lime and other powdered admixtures used in these tests slightly increased the work-ability of the leaner mixes (1:9 and 1:6) as measured by the slump test. Ordinary mixes (1:5 and 1:4) were little affected; richer mixes (1:3 and 1:2) were made less plastic."

It is easy to find fault with the slump test; for instance, as the very first value under normal consist-

ency where ½ to 1 in. slump is expected, we find 6.1 in.; but with all of its faults, the slump test is the best one we have for measuring plasticity and some judgment can be formed from these results.

The effect of lime may best be realized by comparing the average slump in each column with the corresponding slump without lime. In 36 of these averages (including all mixtures and all percentages of lime), only 11 are less than the straight cement specimens. The increases with lime are 1:6, 31 per cent; 1:5, 112 per cent; 1:4, 37 per cent; 1:3, 19 per cent; 1:2, 12 per cent. This states that "for the richer mixes the slump was decreased," but it is seen in 1:2 concrete 5 per cent of lime increased the strength 26 per cent, and 10 per cent of lime, 34 per cent, averaging all consistencies. The four richer mixes average a steady gain up to 33 per cent.

Conclusion 11—"The wear of concrete was not sensibly increased by hydrated lime or other admixtures up to 20 per cent of the volume of cement."

Table XI cites ten cases of which seven average 8 per cent less wear when 10 per cent of lime is added, and the eighth case wears better with 33 per cent of lime than without. The average of all specimens containing 10 per cent (which is about the maximum amount used in practice) reveals that there was 2.7 per cent less wear. In Tables XX and XXI, four-fifths of the cases where 5 per cent of lime was added show less wear than the average of all specimens up to the maximum of lime used in practice.

Conclusion 12—"The bond resistance was affected in the same manner as the strength by the presence of hydrated lime."

Four ages are studied here, but as only two of them show decreased strength, one can hardly draw any conclusions. In this study, lime was substituted for rather than added to the cement, which practically invalidates the figures.

Conclusion 13—"Hydrated lime had little effect on the absorption of dry concrete, increased the evaporation of water from wet concrete and produced no beneficial effect on the strength of concrete stored in air."

These curves are so close together that it is hard to see how one can conclude that evaporation was increased.

It is felt that these figures show that lime in concrete in the amounts usually added, does not reduce strength, but aids considerably in improving the plasticity, resistance to wear, volume, and freedom from voids. Lime is not hydraulic and stamps and storage is not a favorable condition for it, but 88 per cent of the specimens were so stored. Under conditions more like actual practice, the lime specimens would undoubtedly have made even a stronger showing. As a whole, however, the work was well planned. A wider scope than ever before was attempted with more refined methods and more thought to eliminate errors. There are many erratic figures, but the series as a whole compares well in this respect. Suitable emphasis in the results has not been given to the vitally significant matter of determining how much lime can be added before beginning to reduce strength.

Washington, D. C. L. H. HART,
Nov. 23, 1920. National Lime Association.

[The above letter was submitted to Prof. Abrams, whose reply to Mr. Hart follows.—EDITOR.]

Sir—The writer is glad to take advantage of this opportunity to reply to the criticisms of our report on "Effect of Hydrated Lime and Other Powdered Admixtures in Concrete." It is unfortunate that the text of our report is not available; however, it will be published at an early date in the 1920 Proceedings of the American Society for Testing Materials.

It was a surprise to the writer that Mr. Hart comments somewhat adversely on the wide range of our tests. Many years' experience in testing concrete has shown that it is necessary to cover a wide range in order to determine the underlying principles. A large portion of the concrete tests reported in literature are almost worthless because they do not cover a sufficient range to give conclusive values. Instead of considering the wide range of the tests a weakness, we believe that it is just that feature to which the report owes its principal value. If the tests had been restricted to a narrow range of hydrated lime percentage, consistency, or cement content, we could not have discovered underlying relations. A great many engineers have been seriously misled by attempting to draw conclusions from narrow range of concrete tests.

There is no reason why undue weight should be given to the higher percentages of hydrated lime, if one is not interested in those values. The data are given, but attention can be concentrated on the smaller percentages if desirable. Whether or not the 50 per cent values are considered has little or no influence on the conclusions.

Re Conclusion 1—We were primarily interested in the general effect of inert powdered admixtures in concrete. Many powdered admixtures besides hydrated lime are of interest to concrete engineers; 17 other materials were used in our tests. The conclusions should be interpreted on this broad basis rather than with hydrated lime only in view. The tests show that certain types of admixture (pulverized granulated blast furnace slag, for example) are beneficial to concrete strength, possess all the advantages of hydrated lime and probably can be used at a lower cost.

Mr. Hart makes two errors in stating that "all the specimens have been averaged together whether they contain small amounts of lime or 50 per cent." (1) The values were not averaged, but the effect was determined from the slope of the curve plotted as described below, and fully explained in the original report. There is no reason for anyone falling into an error on this point. It conveys an entirely erroneous impression to say the values were averaged. (2) This conclusion was not based on all sepcimens, as the reader who had the original report before him would readily discover. Conclusion 5, which Mr. Hart omits, stated that "Pulverized slag up to 50 per cent of volume of cement gave a slight increase in strength of concrete . . ." This was one of a number of "exceptions noted below;" other exceptions were covered in Conclusion 6 which Mr. Hart quotes.

The expression "relation is a straight-line" which Mr. Hart places in quotation at two points, does not appear in our report. It is not good English and, as stated, does not indicate what we considered to be the facts. The statement (on page 17) was "It will be noted that in these figures the relation between the strength and the volume of hydrated lime used is essentially a linear one."

The effect of hydrated lime was studied by plotting the strengths against the percentages of hydrated lime and drawing a smooth curve through these points. In general, curves drawn in this way closely opproximate straight lines. The average slope of these lines was taken as a measure of the effect of powdered admixtures on the strength of concrete. The fact that some of the curves and tables contained values with small percentages of hydrated lime which are higher than those without hydrated lime, has no significance.

unless we inquire into the cause of the effect found in each instance.

It is clearly stated in our report that there are regions where hydrated lime increases or does not materially reduce the strength of concrete. These cases may in general be classified under: lean mixtures; fine aggregates; and accidental variations in the values which do not affect the general trend of the results. The effect of hydrated lime under the first two headings is fully covered by the tests and the discussion in our report. Accidental variations in tests are discussed below under Conclusion 4.

Mr. Hart objects to our using percentages of hydrated lime higher than those recommended for use in concrete. He does not state on what information those recommendations are based. He also criticises us for not investigating the effect of hydrated lime below 5 per cent; yet the smallest percentage recommended is 12½ per cent (by volume).

Re Conclusion 2—It should be stated that we are dealing with facts and not fancies. There has been ample opportunity for presenting evidence to show that hydrated lime prevents segregation, produces easier flow in chutes, etc., as claimed by Mr. Hart. The only tests with which we are familiar that were carried out specifically for the purpose of studying these points do not verify these claims.

The "by eye" method of drawing curves through plotted points is universally used by engineers; it is quite satisfactory and surprisingly accurate. The nature of the mathematical methods suggested is not divulged. It was not considered necessary to go into an elementary discussion of curve-tracing. The cause for minor discrepancies in concrete tests should be apparent to any engineer conversant with this subject.

It is not clear why Mr. Hart has placed particular emphasis on Fig. 2, in which a number of the curves were derived from tests made on lean mixtures which, as pointed out in our report, show an increase in strength with hydrated lime. We are at a loss to understand how anyone can interpret Fig. 1 as showing an increase in strength of concrete due to the presence of hydrated lime.

Re Conclusion 4—The absurdity of studying the effect of hydrated lime by adding 1 per cent of this material to concrete must be apparent to anyone experienced in concrete tests. The absurdity should be all the more apparent to one who has our report before him, since it is stated in a number of places that 1 per cent by volume of hydrated lime reduced the strength of ordinary concrete mixtures about 0.5 per cent. The most careful concrete tests will show variations of several per cent, unless a large number of tests are made in establishing each value.

Mr. Hart has overlooked the fact that we are stating a rate . It is not necessary that our observations be restricted to 1 second in determining that a pulley is running 2.1 revolutions per second. It is not necessary for a machine to run for an hour to establish the fact that it can be run at 30 miles per hour.

Mr. Hart has pointed out that hydrated lime makes its poorest showing under the conditions in which concrete is usualy used and tested, that is (a) aggregate graded 1½ in.; (b) consistency 1.10, which represents the best consistency for road construction and other high-grade work; (c) age 28 days. All designs are based on the 28-day strength of concrete. Most concrete engineers are coming to a saner use of mixing water. It does not seem practicable to modify the accepted sizes of the aggregate for the benefit of hydrated lime.

Re Conclusion 7—The comments are not borne out by the tests. In order that concrete containing hydrated lime may be plastic, sufficient water must be added to produce a plasticity in the lime which approximates that of the concrete. The statement "that it is unnecessary to use so much water in the lime batches in order to secure equal plasticity" does not change the observed facts.

Mr. Hart has misinterpreted Fig. 7, in spite of the explanatory notes which accompany that figure and in spite of the fact that this error has already been pointed out on a number of occasions. It is stated in our report that this table does not show directly the effect of hydrated lime on the strength of concrete. We went so far as to give an example illustrating this very point, so that the most careless reader has no excuse for misinterpreting the diagram. This diagram shows the fundamental relation between the strength of concrete and the water-ratio. While it is true that for the same water-ratio the strength of concrete with 50 per cent of hydrated lime is higher than that without hydrated lime, we must not lose sight of the fact that the water-ratio must be increased when hydrated lime is used. If the same quantity of water were used (the same water-ratio) the concrete containing hydrated lime will be less plastic; allowance must be made for this condition by adding water, which in turn reduces the concrete strength.

By identifying some of the points on the two curves in Fig. 7, the absurdity of his interpretation would have become apparent. Consider, for example, the 1:5 tests (identified by four solid circles), which in the diagram without hydrated lime gave a strength of about 2,600 lb. per sq. in., with a water-ratio of 0.87. In the diagram with hydrated lime these points will be found at a strength of about 2,100 lb. per sq. in., with a water-ratio of 1.10. In other words, the strength is reduced 500 lb. per sq. in. due to the presence of the additional water and hydrated lime. For richer mixes the difference in strength will be much greater for the same difference in water-ratio.

Re Conclusion 10—We have not claimed that our method of measuring the consistency or plasticity of concrete is perfect; in fact it is quite apparent that this is not the case. We are still searching for a better method. Our conclusions are based on a careful study of several thousand determinations by the slump test, only part of which are given in our report. It was pointed out that the slump of leaner mixtures was increased with the addition of hydrated lime (accompanied, of course, by the addition of water).

Mr. Hart's method of calculating the percentages in the discussion of the slump test is erroneous. By this method if a cylinder slumped 7 in. and we get "an increase of 112 per cent we would then calculate a slump of 14.8 in. which is absurd, in view of the fact that a 12-in. cylinder was used.

Re Conclusion 11—Our conclusion with reference to the effect of powdered admixtures on the wear of concrete was based on all wear tests made in this investigation, none of which have been omitted from the report. If we are permitted to select certain data and ignore other almost anything can be proven.

Re Conclusion 12—With reference to the substitution of hydrated lime for cement, it may be stated that some of these tests were made over three years ago, when it was common for the advocates of hydrated lime to recommend the substitution of lime for cement. We recognized that this was a poor practice and it was not followed in later tests.

DUFF A. ABRAMS,
Professor in Charge, Structural
Materials Research Laboratory,
Chicago, Dec. 11. Lewis Institute.

News of the Cement Mills

National Cement Co. have purchased the property of the Empire Cement & Limestone Co., Portland, Ga., and has taken possession. This is a crushing plant, with one 8 ft. 6 in. by 125 ft. rotary kiln, with the necessary equipment for making cement. It is not intended to operate as a cement plant at present. Efforts will be confined along the lines of crushed stone and the company will shortly install a large jaw crusher under the direction of George E. Nicholson.

The house highway bill providing that cement manufacturers must not discriminate as to price, quality, or time of delivery between products sold for public works and that to be used in private projects, passed the house of the Iowa legislature.

The bill was drawn by the committee after an investigation of cement marketing conditions and a report on the inquiry to the effect there were indications of combinations of cement men and price dictation.

The bill also is designed to prevent pyramiding broker's commissions.—Des Moines Journal.

A. D. Stancliff, general superintendent of the Western States Portland Cement Company, together with five other officials of the big manufacturing plant now in process of construction east of Bettendorf, Iowa, will move here and take up their permanent residence in Davenport about May 1. They will move their families here from Kansas City, Mo.

Activities at the Peerless Portland Cement plant at Union City, Mich., are booming. The company has put into operation on its tramway, that runs to the claybeds two miles south of the town, a six-ton gasoline locomotive of a type used in mine work. This new mine engine is to replace five teams of horses that have been carrying on operations the past two months.

The Petoskey Portland Cement Co., Petoskey, Mich., have started operations in their new plant, which comprises 377 acres of more than 100,000,000 tons of lime stone. The plant with present manufacturing facilities is prepared to produce 2,500 barrels daily and when required, additional units will multiply this production. Expert cement plant managers from all parts of the United States are coming to Petoskey daily to inspect this plant, which is said to be the most modern in the entire world. Its machinery in every department is of the very latest labor-saving and efficient type.

The Petoskey Transportation, now being organized, is expected to have its boats in operation hauling cement and stone from the Petoskey plant to all lake ports within a short time. These boats will also haul coal to the Petoskey plant.

In connection with the installation of the new Allis-Chalmers compeb mill in the finish department of the Nebraska Cement Co., Superior, Neb., a large motor is to be installed. The new motor is 500 hp. and has been unloaded. The compeb mill is to take the place of a portion of the old equipment. The installation of this new mill and large motor will greatly enhance the efficiency of the plant and allow the finish end in a measure to keep up with the other departments, which are to be augmented soon when the third kiln is started. This kiln is in the kiln room and is being set and made ready as rapidly as possible. In addition to the 500 hp. motor about 100 other motors are in operation.

Colorado Portland Cement Co., Portland, Colo., recently put in coal stokers on dryers in its plant, replacing gas producers. An additional hammer mill will be installed in the raw end so that the preliminary grinding for both tube mills and Fuller mills, four of the former and seven of the latter, will be handled with hammer mills. One of the Kominuters, formerly in the raw end, has been moved to the finish end, giving five preliminary finish mills.

A United States patent has been granted covering what is claimed to be an improvement in the wet process for manufacturing portland cement. It frequently happens that the slurry sets to such an extent as to prevent its efficient handling in the usual apparatus. The object of the invention is to provide a setting preventive which will facilitate the use of the wet process, and subsequently be destroyed in the kiln. One quarter of 1 per cent of sugar has been found satisfactory, since it prevents setting in the slurry, and is, of course, eliminated during the clinker operation. Molasses, oxy-acids, oxy-aldehydes and oxy-ketones are examples of other suitable materials.

T. H. Huling, formerly of Chanute, Kans., is now located at 504 Peoria avenue, Dixon, Ill., having accepted a position with the Sandusky Cement Co., as plant engineer.

Cementos Portland Monterrey, S. A. Monterrey, N. L. Mexico, originally a Puzzalano cement plant is being reconstructed and converted into a true Portland cement plant. Practically all of the machinery of the old plant is being redistributed and made use of, but the old machinery is a very small part of the entire installation. The stone and shale crushing plant is being equipped completely with Kennedy-Van Saun equipment. The drying plant is equipped with Ruggles Coles dryers. The raw grinding department is equipped with Allis-Chalmers Compeb mills. Two Vulcan Iron Works kilns are being installed, also Vulcan coolers. The finishing grinding will be done with Allis-Chalmers Ball Mills and Tube Mills. The raw materials are limestone and hard shale, both of excelent quality and inexhaustible quantity. Individual electric drives will be used and the fuel will be crude oil. The capacity will be about 170 bbls., and it is expected to start operation about Sept. 1st. H. E. Leach, formerly superintendent of La Tolteca Portland Cement Co., Mexico City, Mex., has charge of design, construction and operation.

A large number of men are at work at the site near Rapid City, S. D., where the state will install a state owned cement manufacturing plant at a cost of $3,000,000. The men are putting down test holes. In each case the drill has passed through 38 feet and more of the finest cement materials, showing there is an abundant supply stored in the earth where the plant

will be located. The work of constructing the plant and installing the necessary machinery will be commenced as soon as the preliminary drilling is completed.

The plant of the Alsen Cement Co., of America, Alsen, N. Y., will resume operations at an early date according to Mr. Rosoff, of the Rosoff Engineering Co., Park Row building, New York, N. Y., who was the successful bidder on the Alsen plant which was sold recently at auction for $301,000.

M. E. Jenkins, of the Rosoff Engineering Co., is making an inventory of the plant. Mr. Grainer, superintendent of the plant, is placing the plant in good working condition and perfecting the plant organization.

The Alsen Cement Co., was capitalized for $2,400,000 and had a capacity of 1,000,000 barrels per annum. The plant is a dry process plant with seven 7x120-ft. kilns. The former officers were: Lucian Alsen, president; W. P. Corbett, vice-president and secretary; Frank Stranahan, treasurer, and George Grainer, superintendent.

The Phoenix Portland Cement Co., Nazareth, Pa., H. H. Leh, superintendent, has just completed the installation of a Merrick weighing machine for automatically weighing the coal used as fuel in the kilns and a duplicate installation for determining the clinker output daily or hourly.

A Traylor 48-in.x18-in. "AA" roll has also been purchased for reducing clinker preparatory to grinding in the new compartment tube mills.

The entire plant has been completely electrified by the installation of individual motors and Link-Belt Silent Chain drives from 5 to 400 h. p. each.

How far Maricopa county, Arizona, can go in aiding construction of a cement plant in Phoenix depends upon the provisions of the house bill, passed by the last legislature, regarding the issuance and sale of bonds for the construction and maintenance and industrial plants, it was brought out during a conference several weeks ago between the county board of supervisors and other interested parties.

Assistant County Attorney Forest, as legal advisor to the board, attended the conference and a copy of the house bill was obtained. An opinion on the matter will be rendered by Attorney Forest, defining the power of the board of supervisors in the erection and operation of the proposed plant as contained in the law. A. F. Jones, chairman of the county highway commission; J. G. Peterson, secretary; W. W. Lawhon, president of the chamber of commerce; members of a committee from the county real estate board and other citizens were present during the conference.

During the discussion, reference was made to the recent decision of the California supreme court holding that a city or county cannot operate a cement plant in competition with private commercial enterprises, production being confined to the use of the city or county on public improvements. Whether a similar restriction prevailing in Arizon, would mean that leasing of the plant to a private individual constitutes circumvention of the law, will be one of the points included in Attorney Forest's opinion on the matter.

Aman Moore, cement manufacturer from Los Angeles, was present at the conference and outlined a tentative proposal whereby he would advance $300,000 for the plant construction with a similar amount advanced by the county through a bond issue, the two representing the total cost of erecting the plant. Under this plan the proposition might be disposed of by advancing the funds and giving Moore an option on the plant with right to purchase.

If the plan went through the plant would furnish the county cement at a rate not exceeding 5 cents a barrel over production cost until the $300,000 had been repaid.

Figures were presented at the conference to show that the establishment of a cement plant is entirely justified by the consumption of the state. In 1919 this totalled 366,000 barrels and the following year jumped to 515,000 barrels. From these figures, it was pointed out that no state in the union equaled the consumption without a plant in the state.

Mr. Moore declared that with a cement plant in Phoenix competition from California could be met as far west as Yuma and from Colorado and El Paso plants as far east as Albuquerque. Coal for the plant would be shipped from Galup, New Mexico.

He recommended that the capacity of the plant range from 1,000 to 1,200 barrels a day.

With $2.00 a barrel the maximum cost of production in California, the county highway commission here pays $2.40 a barrel for the cement, it was pointed out and in addition a $1.52 freight rate, which figures $1.92 expended over the production cost. This excess would equal approximately the production cost to manufacture cement in Phoenix.

An adequate material deposit exists within 95 miles of Phoenix in the Winkleman district and the materials could be shipped from that point. According to Mr. Moore he investigated the field and from other reports stated that the quantity was unlimited there and the quality perfect. In addition to his deposit 25 per cent of necessary clay and shale deposits exist here.—(Phoenix, Arizona Gazette.)

V. S. Adkins of the division of chemistry from the University of Texas, has completed a survey and reports on the vast cement making formations in Grayson county, between Denison and Red River, and his reports show there is an unlimited supply of materials for the manufacturing of cement of the highest grade in this section of Texas.

Some years ago a survey was made by government geologists of the same formations, but for some reason the reports made of the survey were lost here and through the efforts of the Denison Chamber of Commerce another survey was recently completed showing that the formations here will furnish the highest grade of materials for first class cement and all formations are of such a nature than they can be readily mixed into cement with the least bit of trouble.

Governor McCray, of Indiana, has confided to the new reformatory removal and highway commissions a plan which he estimates will save the state $1,000,000 or more annually, and also divorce the state from dealing with private interests in the purchase of cement for road building. Briefly, the governor's plan is to build a big cement mill in connection with the new reformatory at Putnamville. It probably will be turning out cement for the state's new roads in 1923.

Official announcement of the project has not been made but Governor McCray has discussed his program with members of both commissions, who are understood to have indorsed his plans. All details however, remain to be developed but this, it is planned, will be done in erecting the new reformatory at the site near the penal farm.

Land already owned by the state in Putnam county

provides an abundant supply of limestone from which the cement can be manufactured and the total available raw material nearby is said to be sufficient to last several generations. Reformatory prisoners would be used by the state as workmen in the mill.

State manufacture of cement at its own mill is estimated by the governor as certain of saving $1 a barrel, and the future road building program of the state is expected to call for use of at least 1,000,000 barrels a year. Funds now available for the work of removing the reformatory from Jeffersonville and erecting a new institution at Putnamville are expected to be used for building the cement mill. (Greensburg, Ind. News.)

The Golconda Portland Cement Co., Golconda, Ill., according to newspaper reports, are opening up a new quarry at Shelterville, Hardin county, Ill., on the Ohio river, a few miles above Paducah, Ky. Limestone for making cement, abounds in exhaustible quantities there. The company also will produce limestone fertilizer.

W. S. Campbell, San Antonio, Tex., and John J. Shorp of Castorville, Tex., have formed the Gulf Portland Cement Association and filed a declaration of trust for a capitalization of $300,000. They have acquired large deposits of cement making stone near Castorville and it is planned, according to press reports, to build a cement mill thereon.

Inconor Garcia Lastres, General Manager, Peruvian Portland Cement Co., 152 Avenida Pierola, Lima, Peru, writes: "We own in Lima a dry process cement mill, built two and half years ago, which is the first and only one existing in this country. It is equipped with Krupp ball mills, Bonnot tube mills in both raw and clinker ends, and a 60x60 Vulcan oil burning kiln. We run the mill at full capacity all the time, and sell immediately all that we manufacture, capacity 150 to 175 barrels per 24 hours. Our capacity is so small we are unable to fill orders. Capital in Peru is very scarce and difficult to obtain for large industrial concerns of whatsoever nature. We are already enlarging our mill, but very slowly, and out of the profits, and this is not sufficient or in accordance with business methods. Our mill and business must be enlarged immediately to cope with the requirements of the country and shut out competition from all sources, and for this reason, we have thought that it would be a good business scheme and a friendly act to the United States, a country which we greatly admire, the writer having visited it on several occasions, to **associate our company with some other company in the United States,** owning a modern mill, by the dry process, with the machinery in good condition, but unable to make satisfactory profits, by reason of local competition which in the United States runs very high, on account of the existence of so many cement mills. Such a mill could be dismantled, shipped to this country, either through New York or San Francisco, and re-erected in our property. As soon as we have obtained the requisite information, of an available mill or mills, and the willingness of the owners to enter into this arrangement with us, I will go to the United States furnished with the fullest powers on behalf of this company, to arrange matters and close the deal, as also to see to the dismantling and shipment of the mill to Peru. All our machinery is run by individual electric motors. By a pre-determined arrangement, our stock issue would be increased to a proper amount, and payment made with it, to the owners of the American company, in an amount fixed by mutual agreement.

Bonnot Pulverizer and Air Separator is Used for Variety of Fine Grinding

The Bonnot pulverizer in connection with air separator comprises a most efficient unit for fine grinding or pulverizing.

The process of separating by air is largely used where it is desired to obtain a very fine or impalpable product. It is well adapted to such work because of the uniformity of the product that can be obtained and the relatively small amount of wear of the separating mechanism.

It is necessary that the material to be pulverized shall be thoroughly dry, containing preferably less than 1% of moisture.

Briefly, this process is the lifting of finely ground or impalpable material in a current of air which is then expanded or rarified so that the coarser material drops of its own weight. The next step in the process is to separate or precipitate the fine or impalpable material from the air in which it is suspended. This second step in the process is accomplished in the device designated as a collector. Here the velocity of the air current is still further reduced and its direction of travel changed repeatedly causing it to lose its carrying force and the fine material is thus precipitated.

The Bonnot pulverizer is equipped with a very simple and efficient air separator. This unit was designed to meet conditions where air separation is preferable.

The base of the separator is attached to the top of the grinding chamber and is made with the sides flaring or diverging to form a large air chamber into which the material is thrown in a constant stream by the grinding parts. The air current entering at the bottom of the separator passes upward carrying the fine material, and, because of the increased area toward the top of separator, the velocity of the air current is reduced, which allows the coarser material to fall back into the grinding chamber, while the fine material is carried upward.

The air current, carrying the impalpable material, passes from the separator through the pipe connecting it to the collector and entering the latter on the side, takes a horizontal motion.

The collector being polygonal in shape, the various sides or faces break up and change the direction of the air current as well as reducing the velocity. This allows the material in suspension to drop to the discharge pipe at the bottom of the collector. At the top of the collector a connection leads to a small auxiliary collecor of similar shape, which is designed o remove any fine material still remaining in suspension.

The pulverizer and separator are suitable for the fine grinding of a great variety of materials, including coal, clay, lime, limestone, coke, carbon, phosphate rock, barytes, cement and many others.

This system, which is made by the Bonnot Co., of Canton, Ohio, can be furnished with either screen top or with air separator, according to which is most suitable for the operating conditions.

The advantages claimed for this pulverizer are that but few parts are used, the entire absence of lubricated bearings inside of the grinding chamber and the accessibility and ease with which wearing parts can be renewed.

News of the Concrete Products Factories

Chas. Harris, Batavia, Iowa, operates a Christopher block machine and a Little Wonder block machine. Is interested in roofing tile, building tile, porch columns and a tamping machine.

Cinder concrete block have made a distinct commercial success for F. J. Straub in New Kensington, Pa. Mr. Straub has a patent on the idea. While there is nothing new about the use of cinders in concrete, or for that matter in present units, Mr. Straub bases his claim of originality on the use of whole cinders without the admixture of sand, and has enforced the patent claim in the courts against competitors.

Mr. Straub started in the block business in New Kensington seven years ago. He experimented with cinders which were practically a waste product, and made block to stand a net crushing strength of 1,692 pounds per square inch, which, with a 50 per cent hollow area, gave a gross strength of 846 pounds over the 1,180 square inches of area of the block. This test was made by the Pittsburgh Testing Laboratory and reported September 9, 1915.

The 8x8x16 block have been used chiefly as a backup for brick and as a base for stucco, and a 4-inch block for partitions.

The cinders are elevated and passed through special rolls running toward each other, one at a speed ten times that of the other. The cinders proved a difficult material to crush, and only after considerable experiment were they handled satisfactorily without clogging.

From the rolls the cinders feed to a measuring box above a Blystone mixer.

Nine silos erected in 14 days with a crew of 3 men, assisted by 2 farm hands, is the remarkable record made by the Playford Silo Co., Clarkfield, Minn. This is at the rate of one silo in a trifle over 1½ days' time. According to the builders, much credit for this extraordinary speed of erection is due to the type of scaffold used. O. F. Johnson, of Granite City, Minn., who is working with the Playford Silo Co., is the inventor. His scaffold has been in use three seasons.

Like several of the recently perfected cement stave silo erecting scaffolds, the Johnson scaffold is supported on top of the silo wall. A novel feature of this scaffold is the gauge which helps the builder to keep the silo wall a true circle. Radiating from a wheel-like device in the center are eight arms, four of which are of gas pipe and four of 2 by 6-inch pieces. The arms are attached to the center wheel in such a way that by turning the wheel to right or left with the sweep the scaffold is expanded or contracted. Four arms are longer than the others so as to project over the silo wall at quarter points when extended and serve to support the scaffold.

The scaffold is raised after the setting of every row of staves. For hoisting, ropes are attached to four supporting arms and run through pulleys set on the the tops of four staves at quarter points on the silo. Each of the two workmen hold one raising rope. When the scaffold is ready for raising, the sweep is turned so as to pull in the arms, leaving the scaffold hanging free. It is then hoisted up 15 inches or the height of a half stave and the circle expanded until the supporting arms rest on the next higher row of staves. At the same time the gauge circle is expanded and acts as a guide for building the silo wall exactly circular. When the silo tub is completed, the scaffold is contracted and is lowered 6 or 7 feet at a time just as the inside wash is applied.

The Johnson scaffold is adjustable for building silos of different diameters and is light enough so that the entire outfit can be moved from one job to another on a two-wheel trailer coupled behind the car which carrits the crew.

The Oakley Concrete Block Co., Cardiff and Fielding avenues, Cincinnati, Ohio, has recently added 50 per cent to its manufacturing space and thereby relieved a congestion which has been a drawback for several years. With working quarters greatly enlarged, the company is now prepared to handle its share of the expected increase in the products business both quickly and efficiently. Their plant is equipped with the most modern up-to-date machines including a Kent Continuous mixer and an Anchor block machine and tamper.

Baier Bros., Cissna Park, Ill., operate a Somers block, Schenk drain tile, Little Giant hand brick machine and a Stewart mixer.

S. A. Porter, Goldsmith, Ind., operates an Ideal block, Peerless brick, Anchor tamper, silo block, chimney block, porches and vase molds, Ideal mixer. Uses white silica sand for facing. Interested in burial vault and flower box molds.

Maryland Concrete Corp., 700 Equitable building, Baltimore, Md., will build a new building 60x100 feet, to have daily capacity 1,000 concrete blocks, and 10,000 concrete brick.

Geo. O. Thomas, New London, Wis., operates an Ideal block machine and power tamper, Helm brick machine and his own make burial vault and silo molds, Frank mixer. Uses white sand and mica spar crystals for facings. Interested in marble chips and white cement. Mr. Thomas would like to know if there is any way of purchasing cement except through dealers. He thinks it is an injustice to manufacturers of cement products to be required to purchase cement through dealers who are handling lumber.

Fred Young and Harold Benedict, Crosby, Minn., have formed a partnership and will manufacture concrete tile and culverts, having purchased a Papke block machine and brick machine and a Dunn machine for making drain tile and silo blocks. Wants prices and catalogs on molds for making burial vaults and sewer pipe, also on waterproofing compounds.

W. R. Harris, 542 Monadnock block, Chicago, was elected president of the Concrete Products Association.

Merrill Moore, Creston, Ia., has placed on the market molds for making poured concrete brick, the kind that are used for faced brick. He will gladly send a cir-

View of Eastern Laboratory of Repauno Plant, Gibbstown, N. J. One of the five great laboratory groups maintained by the Du Pont Company.

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THE tremendous strides made in the development of newer and more efficient types of explosives during the past fifty years are traceable, very largely, to experimental work done in the five great laboratories maintained by the Du Pont Company.

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Wilmington, Delaware

cular explaining the difference between the poured and dry tamped concrete products.

Edward Vandenberg, manufacturer of the Zagelmeyer Poured Concrete block of Kankauna, Wis., has opened a branch factory in Appleton.

Mr. Vandenberg has found that the demand for his poured or wet block has so increased that this step was made imperative and accordingly accepted the overtures made to him to open a branch in Appleton. He will in addition to manufacturing concrete blocks, handle tile, sewer pipe, brick, sand and cement.

A modest local industry of gradual growth is that of making cement products at the factory of Sam McAdam, Aledo, Ill. Mr. McAdam began in a small way four years ago and has gradually extended his plant and sales.

He is making a variety of products, including building blocks and farm tile, the local demand for both being good. Last year he sold one hundred thousand feet of tile, ranging from four to twelve inches, all to local farmers, who hauled it off in wagons.

But tile making is subordinate to building blocks at this factory. On account of freight rates most of the recently built foundations in this section are of cement, or concrete blocks, of which the McAdam factory produces a variety, besides blocks for superstructures. Mr. McAdam is specializing on three forms of blocks for foundations and superstructures, white granite face, cobble stone and pebble stone face. The white granite faced blocks made a handsome wall, as does the pebble stone, which is darker. The cobble stone makes a rough face which is suitable for some classes of architectural effects.

In addition lawn vases of several patterns in which flowers are grown on lawns are made at the McAdam factory.

Mr. McAdam has 6,000 building blocks, and 100,000 tile in his yard for the summer trade.

Thomas Stafford, general contractor, Iron Mountain, Mich., will start the manufacture of cement blocks and bricks next week in a new building just completed.

All the necessary machinery will be installed in a few days. A steam plant is now being put in for the steam kilns, which will be used for the cement blocks, also mixers equipped with a ten horse-power motor.

The output of the plant will be from five hundred to eight hundred cement blocks a day and from twelve thousand to fifteen thousand bricks.

Universal Crushers are dependable producers for the concrete block and tile factory. They are of rugged construction and built for hard service. Parts exposed to abrasive wear and constant grinding action are made of special patented wear-resisting steel. The Universal is admirably adopted to products plants. It saves delays and reduces operating costs. Comparative figures show Universal leadership both in economy and performance. Write the Universal Crusher Co., 230 Bee avenue, Cedar Rapids, Ia., for catalog and prices.

"Dampness has been the great reproach of concrete blocks. Yet this fault can easily be avoided by the use of the best materials—gravel containing little sand, with the addition of Hydrated Lime. The latter increases the density and impermeability of the concrete," writes a well known cement expert. The concrete block, properly made, is a fine building unit. Hydrated lime will also lighten the color of your blocks and makes the faces clearer, because the lime will make the concrete take impressions more sharply.

Prices given on concrete brick in various places per 1,000 brick, f. o. b. plant or nearest shipping point are as follows:

	Common	Face
Bellow Falls, Vt.	20.00	35.00
Bridgeport, Conn.	31.00	32.00
Buffalo, Niagara Falls and Rochester, N. Y.	21.00	.....
Eau Claire, Wis.	20.00	30.00@40.00
Houston, Tex.	.....	22.00
Lockport, N. Y.	17.00	.....
Milwaukee, Wis.	17.00@18.00	35.00@65.00
Omaha, Neb.	32.00	42.00
Piqua, O.	18.00	25.00
Portland, Ore.	25.00	43.00@73.00
Fancy brick	100.00@150.00	
St. Paul, Minn.	18.00	32.00
Springfield, Ill.	18.00	20.00@25.00
Tonawanda, N. Y.	20.00	.....

The use of concrete burial vaults during the last few years has increased at an astonishing rate, reflecting a demand caused in part by the general development of the Concrete Industry—a demand for concrete products of all kinds. Then there has never been a period during which the undertaking profession has made so great progress in all departments as in the last ten years; consequently a much higher grade of funeral furnishings of all kinds are being used now than ever before, and therefore there has been an increased demand for a higher state of perfection in burial vaults. Then again the public in general are being educated out of the old-time method of burying with only an ordinary wooden box to protect the remains; and along with this education has come a spirit of investigation as to what kind of burial vault is best, the result of all this being that the concrete vault is more in demand than any other.

Ideal Concrete Construction Co., 455 Rowell avenue, Joliet, Ill., operate Ideal and Besser block machines and tampers, Ideal burial vault molds, Blystone and Ideal mixers. Interested in molds for making vases, fence posts and flower boxes, also transfer cars.

Parmenter Mfg. Co., Columbus, Kansas, a new organization, advise us they expect to manufacture everything that is practical in the line of concrete products. Want prices and catalogs on molds, machines and materials.

C. F. Bunte Coal Co., Hutchinson, Kansas, manufacture concrete building blocks. They expect to put up several silo bins for storing coal. Want prices on mixers, drain tile, fence posts and flower box molds.

Concrete face brick of good quality and appearance are being manufactured by the Polychrome Cement Tile & Brick Co., of Vancouver, B. C. Two Shope brick machines are used.

In Pueblo, Colo., the Granteoid Construction Co., is building cottages of Hydrostone concrete block which it manufactures along with a line of concrete trim stone. For a house recently built in Pueblo for John Roitz, the walls, porch, chimney and fireplace are all of Hydrostone. The walls are of the two-piece block; faced block outside sold for 35 cents each and rough block for 22½ cents.

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The manufacturing of these Automatic Sealing Burial Vaults with our Adjustable Steel Molds is a big money making opportunity. The first ten vaults you sell will more than pay back your entire investment—materials, molds, time, etc., etc.

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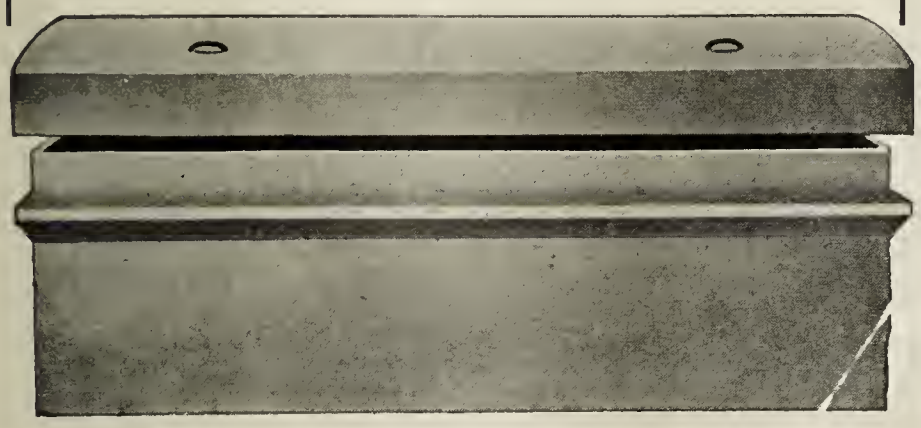
216 E. River St. PERU, IND.



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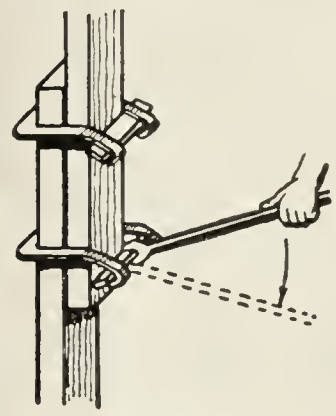

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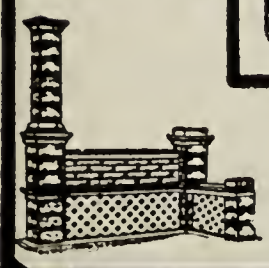

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Turns out, with four men, 1,000 to 1,200 concrete blocks in ten hours.

In severe tests, Perfect Concrete Brick have proven stronger than common clay and pressed clay brick.

The power tamper may be operated by a one horse power motor, a 2½ horse power gas engine or direct from a line shaft.

"There is no better brick machine manufactured," says W. T. Sharp, of Montana, owner of a Perfect brick plant.

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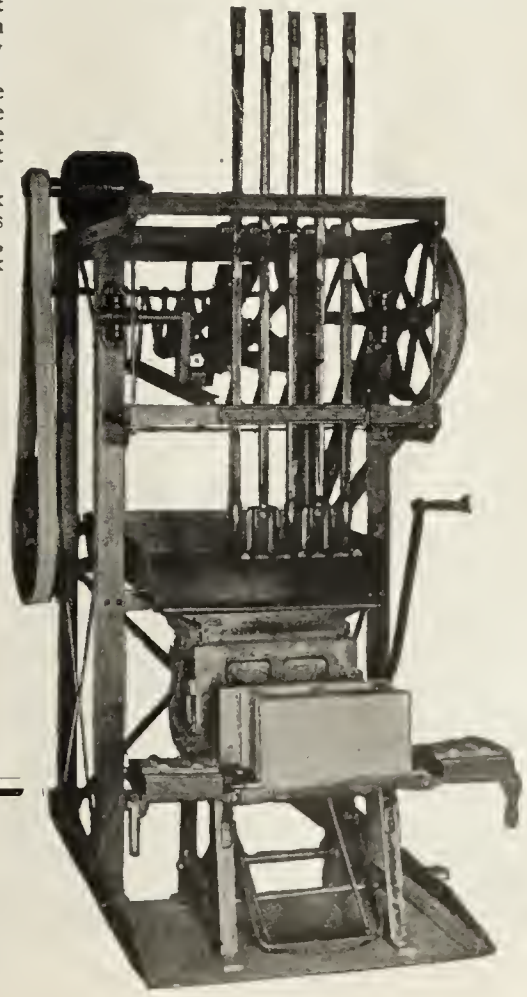

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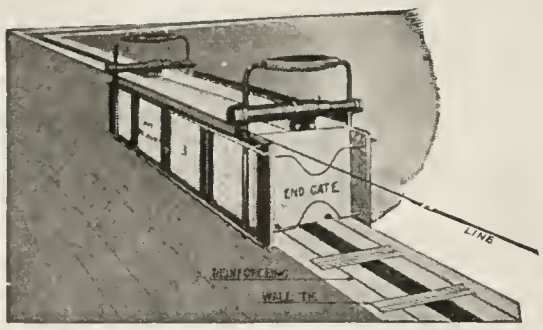

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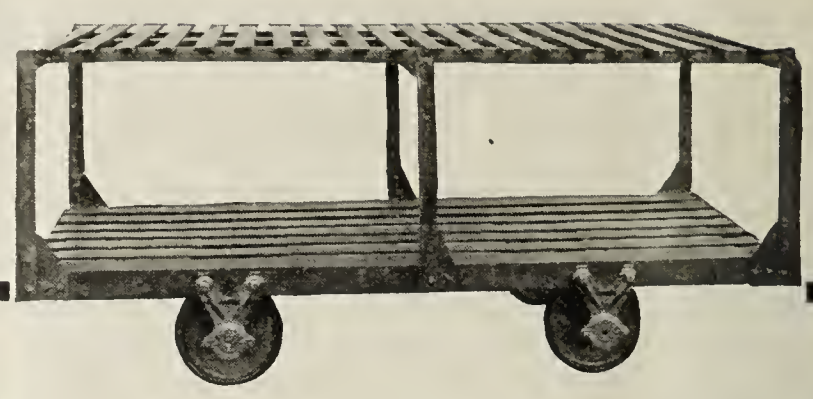

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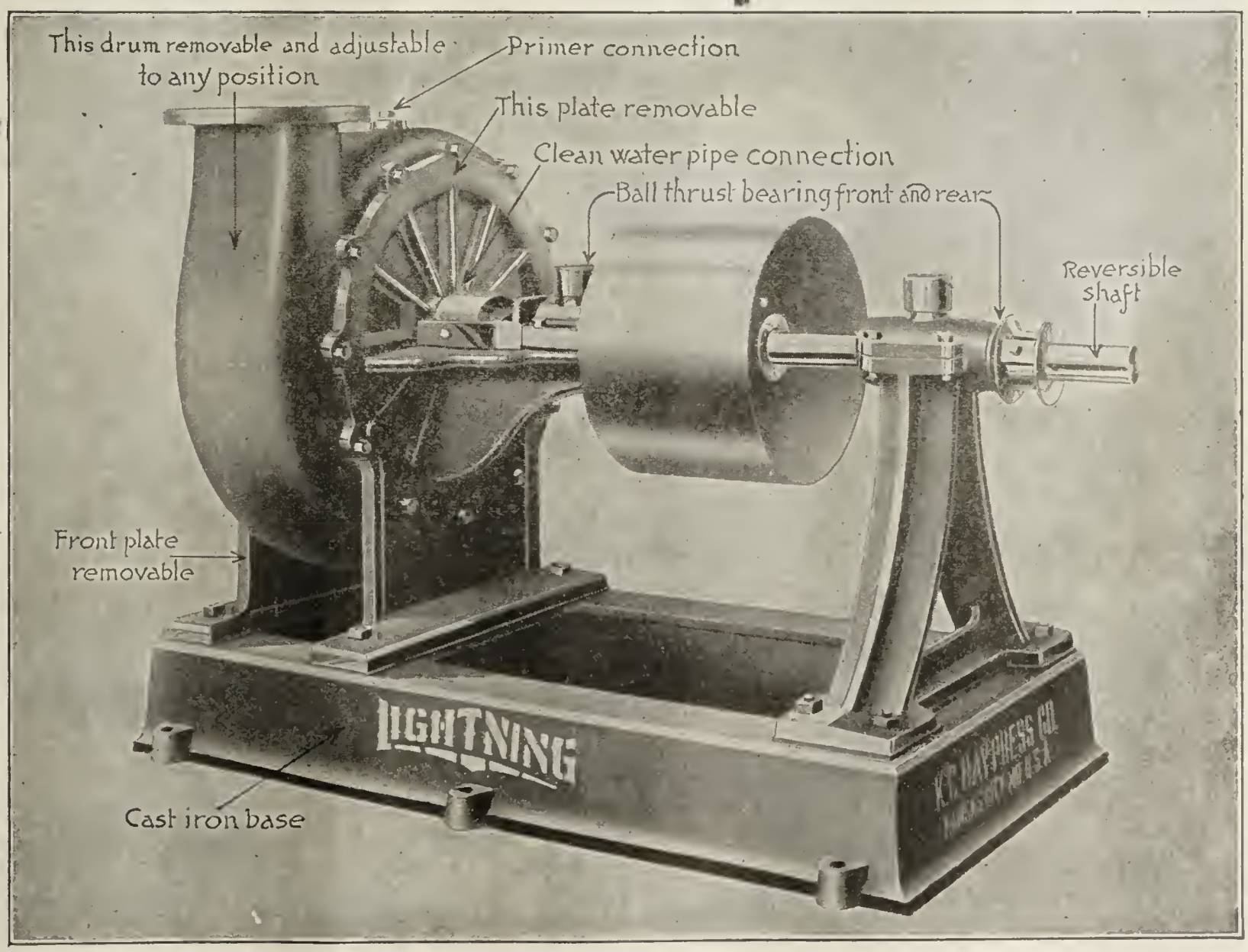

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For the Efficient and Economical Conveying of Sand, Gravel, Crushed Stone, Cement, Clinker, and Coal

Your plant is a success, of course. You have made it such by devoting your energies to it, by carefully studying out every possible way to increase its efficiency and economy of operation. It represents and reflects your personality.

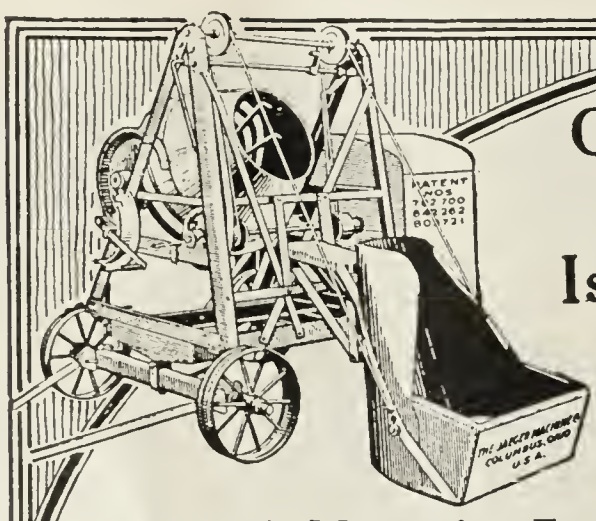
BUT—have you given to conveyor belting the attention this most necessary and important item of equipment deserves? Of course, you know that this method of conveying is universally recognized as the only up-to-the-minute, thoroughly modern way to handle cement, clinker. coal, sand, gravel and crushed stone. But do you know that, in AJAX BELTING, you can get, at a medium price, those features of flexibility and wear resistance which make them stand up under hard, continuous usage in a way which you would expect only from higher priced belts?

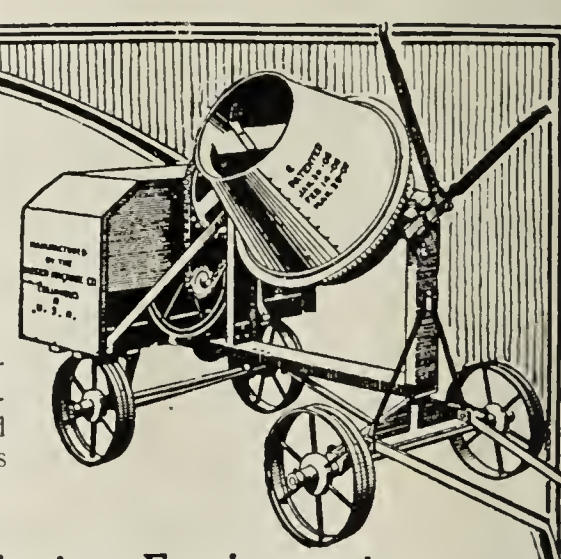
The reasons are evident. Fifty years experience in good belt making, proper materials and the most modern equipment are bound to give RESULTS.

Write us for: "Information On Top Notch Conveyors." It's free.

THE GUTTA PERCHA & RUBBER MFG. CO., 301 W. Randolph St. **CHICAGO**

NEW YORK BOSTON PHILADELPHIA SAN FRANCISCO





One Thing Is Certain THE JAEGER Is a Bear for Speed

Outfitted with Jaeger mixers and Jaeger Placing Equipment you have the time-saving, labor-saving aids that cut cost and land the better jobs and the bigger profits for you.

A Mixer for Every Job

With three sizes of batch capacities—with fourteen different outfits. No matter what kind of concrete work you have, there is a Jaeger Mixer for you. Each Jaeger Mixer is famous for being efficient, economical, strong, durable, and low in first cost.

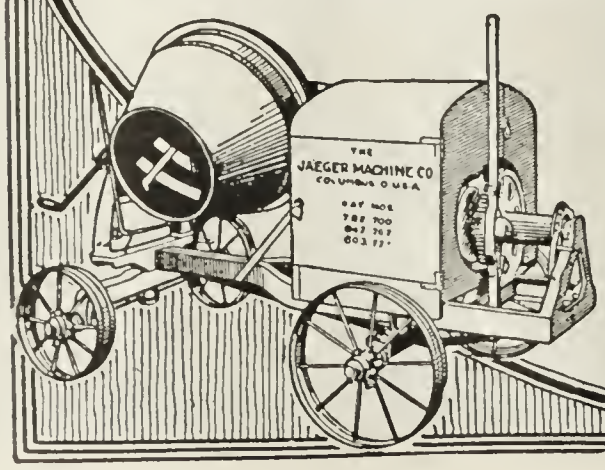
We guarantee the Jaeger Mixers to be constructed of the best material in the best mechanical manner.

Jaeger Placing Equipment

consists of the Jaeger Mixer complete with loader and hoist. Spouting outfit consists of 50 feet of track and 10 foot sections, and adjustable legs. Skip car holds one full batch of concrete and is automatic in dumping and equipped with brakes. The hoist pulls this car up to hopper where it dumps.

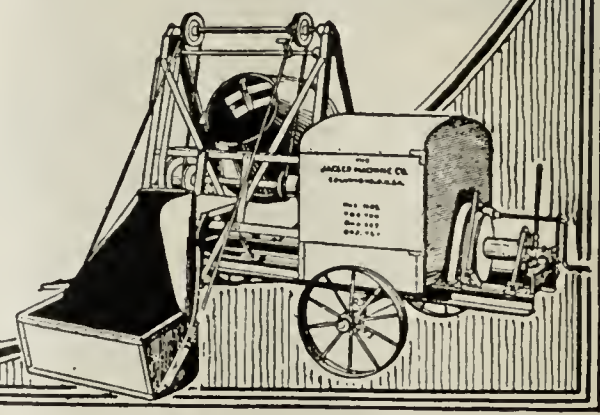
Full information and prices mailed on request.

THE JAEGER MACHINE COMPANY 212 Dublin St., Columbus, Ohio



Quality

Mixers



the 3 essentials

Correct Mixing

Minimum Labor

Quality Products

The three elements to successful concrete block and tile factory operations are inherent characteristics of Kent Continuous Mixers.

Write for Catalog

The Kent Machine Co.

Kent, Ohio

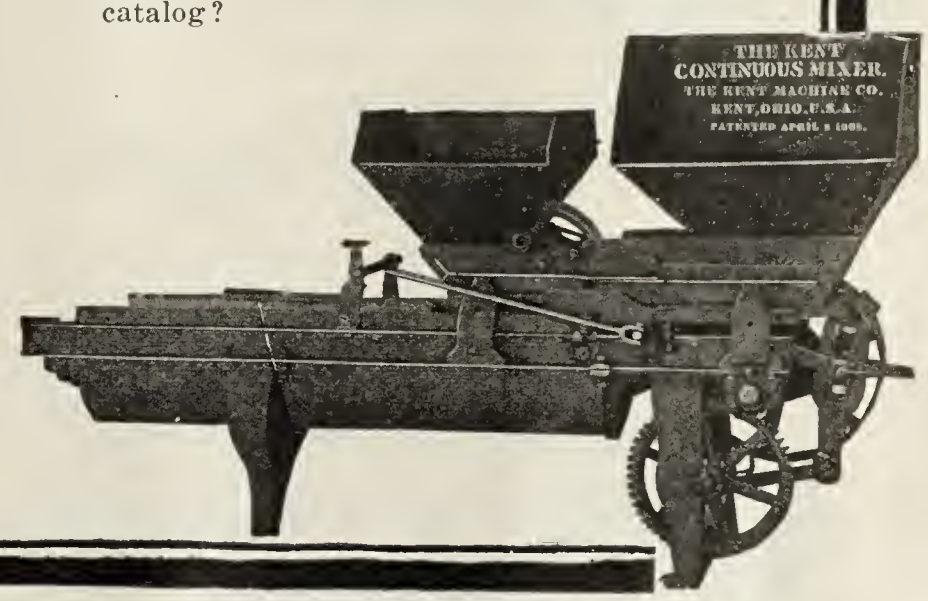
THE CHOICE OF THE WELL INFORMED

THE KENT CONTINUOUS MIXER

We claim—and conservatively—that the Kent Mixer has embodied in its design and construction more real points of superiority than any other mixer made for concrete products factories.

Some of the outstanding features are: Correct and proper proportioning of aggregates; continuous in operation; time and labor saver; especially designed for concrete products plants; does its own measuring, proportioning, mixing, watering and discharging accurately; operates entirely by itself; does away with the cumbersome hoisting cars, charging platforms, chains, cables and what not on many of the old-fashioned batch mixers, etc., etc.

To fully explain these and many other points of superiority—may we send you a catalog?



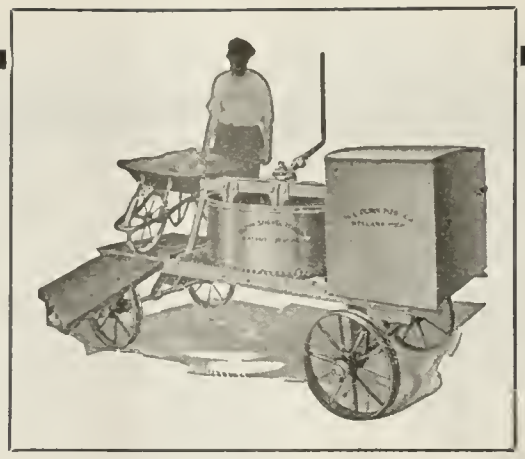
HETTRICK RED STITCHED

CANVAS BELTING

Made from the highest class duck obtainable, having a tensile strength of 500 pounds to the square inch. Sewed in heavy modern machines with specially made twine. Stretched to the proper degree and treated with gums and oils that preserve the fabric and make the belting soft and pliable under all conditions.

Ask for Samples and Prices

THE HETTRICK MFG. CO. **TOLEDO, OHIO**



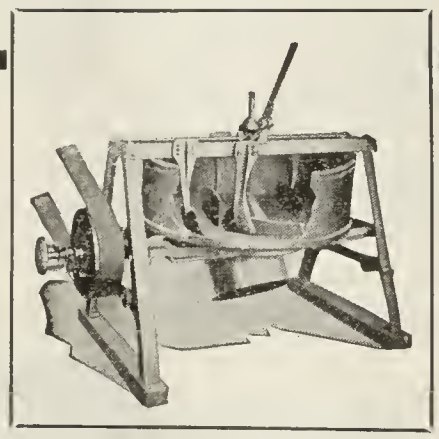
An all-round mixer for all-the-year-round work. Use it on all your concrete, mortar and plaster mixing jobs.

CONTRACTORS USE THIS MIXER ON THREE TIMES AS MANY JOBS

Portable Dunn Shovel Mixers are designed to mix mortar and plaster as well as concrete. They are built to do this work better than you ever had it done before. We want you to expect more service from it than from any other mixer. Don't be afraid of overworking it; keep it busy day after day on all of your mixing jobs. Even if you give it three times as much work to do as you would an ordinary mixer, it won't wear out any sooner.

You'll like the ease by which this mixer is charged, its rapid and convenient bottom discharge, the way it cleans itself, its compactness, portability, sturdiness and dependability. Because it will mix concrete, mortar and plaster and because of its many features, you really get three mixers for the price of one. And you pay no more for it than for an ordinary mixer. Try it out for a couple of weeks before you buy.

Ask Us to Send You Bulletin T-20

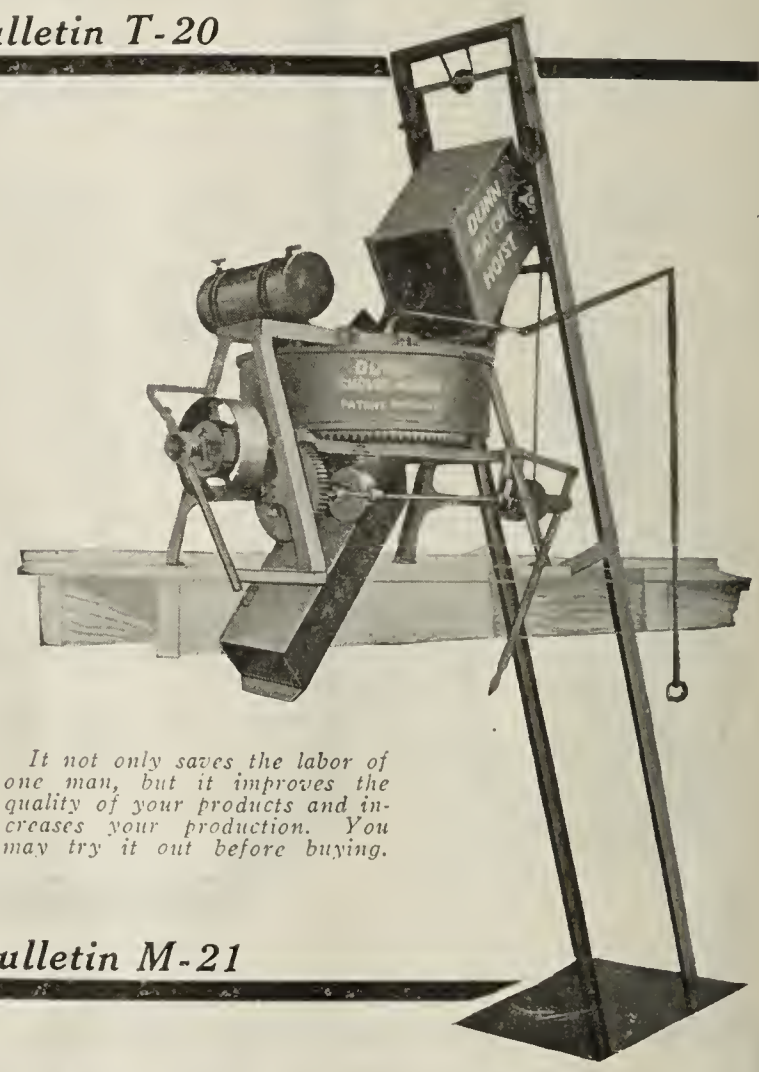


The Dunn Shovel Mixer produces a thoroughly mixed, plastic material because of its four shovels. A hundred times a minute the material is shoveled, stirred and troweled.

RUN YOUR PRODUCTS PLANT WITH ONE MAN LESS

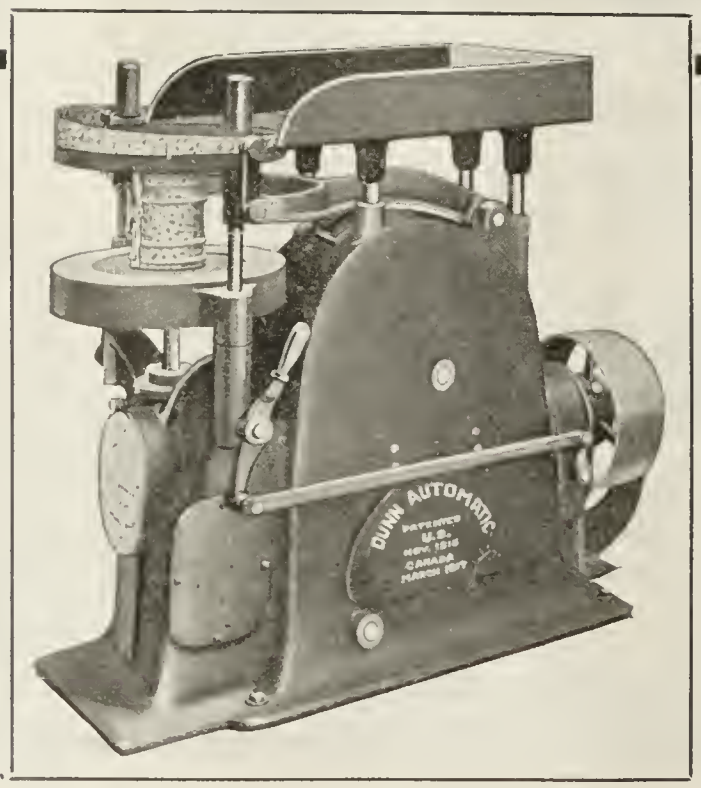
With a stationary Dunn Shovel Mixer properly installed you can improve the quality of your products and increase your production with one man less than you are now employing. Simply because power and gravity are utilized to accomplish automatically what you are now doing by hand. The only labor involved in keeping your production machines, whatever they might be, constantly supplied with material is in loading a bucket below the floor level with the unmixed materials.

You'll be interested in knowing that the cost of this complete mixing and conveying equipment is less than that of the ordinary conveyor alone.



It not only saves the labor of one man, but it improves the quality of your products and increases your production. You may try it out before buying.

Write for Bulletin M-21



THE BUSINESS OF MAKING HOLLOW TILE

The immense demand and market for a more economical, more permanent building unit, such as hollow concrete tile, is readily evident in every community. Supplying this market means a permanent business bringing in large earnings.

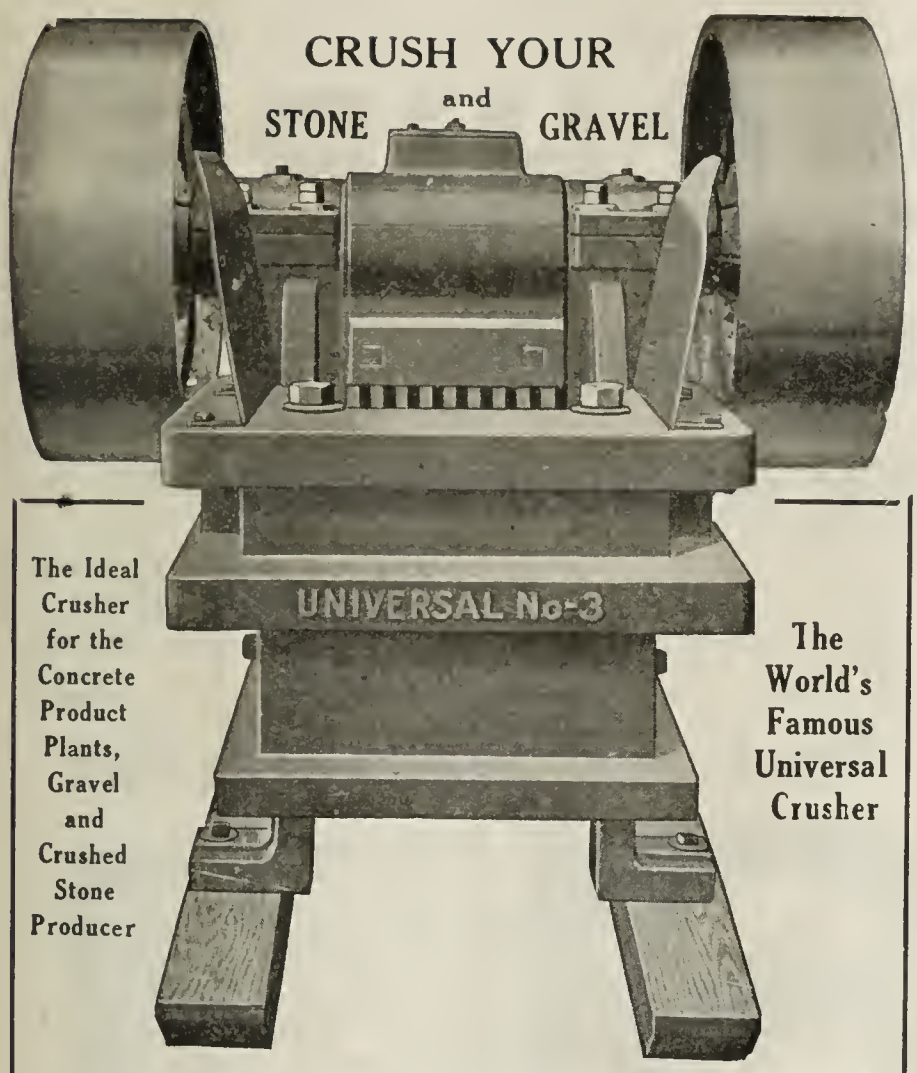
It is a big part of our business to completely equip standardized plants for turning out this hollow tile and other products in large quantities at low cost. That we are able to establish you in a most profitable business is demonstrated by the success enjoyed by all Dunn Plant owners.

There's a whole lot to be said about this proposition which will interest you. Drop us a line for particulars.

W. E. DUNN MFG. CO.

414 W. 24th Street

HOLLAND MICHIGAN



The Ideal Crusher for the Concrete Product Plants, Gravel and Crushed Stone Producer

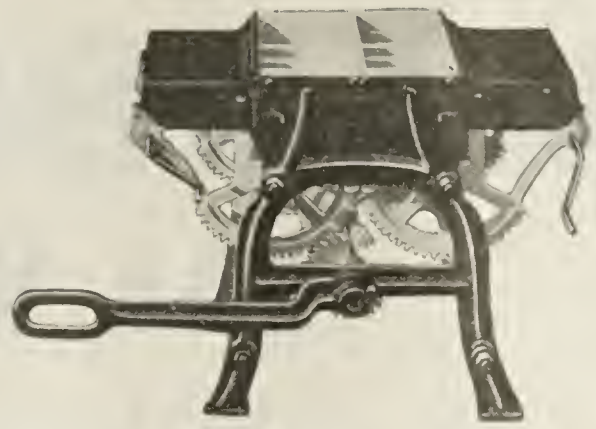
The World's Famous Universal Crusher

We Build Crushers from 5 Tons to 300 Tons per 10-hour Capacity

Instantly adjusted to produce size required from ¼ inch to 3 inches. *Write for Folder No.* 14.

UNIVERSAL CRUSHER COMPANY

230 Bee Ave. Cedar Rapids, Iowa, U. S. A.



Double your daily output with

DOUBLE-SPEED

Brick and Block Machines

Now is the time to increase the capacity of your block plant—turn out the maximum number of wall feet per day, while the demand for building materials is at its highest.

Block Output

Our Double-Speed Block Machine makes in each operation: 2 hollow blocks, 2 silo blocks, 2 solid blocks, 2 slabs, 4 half blocks, 2 water table slabs, 2 return ends, 2 chimney blocks, or 2 porch pier blocks.

Brick Output

Double-Speed Brick Machine makes 16 brick at each operation, 8 brick being delivered at each side of the machine.

Double Speed Tamper

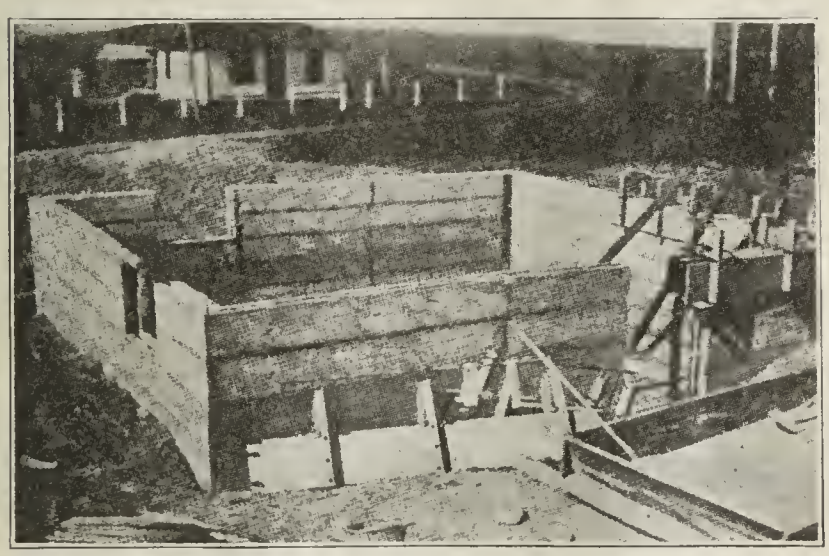
This power tamper gives our block machine a capacity of 1,500 blocks per day and speeds the brick machine up to 15,000 brick per day. Roller-cut-off removes surplus material from mold box and finishes the top of the product. The block and brick are tamped rapidly and vigorously, resulting in a dense, strong product. Machine consumes little power and is practically fool-proof.

Write for block and brick machinery catalog, Dept. A,

Wood Bros. Thresher Co. Des Moines, Ia.

FROST HOLLOW WALL FORMS

ADJUSTABLE TO ANY KIND OR SIZE OF BUILDING



With our forms you can build a double wall, reinforced concrete building to compete with the cost of frame construction.

Moisture-proof, fire-proof, repair-proof walls. Save paint, lath, time and labor to you. Save repair, fuel and insurance to the owner.

Forms adaptable to any size building, adjustable to any thickness wall. Built of poured concrete, reinforced three ways with continuous dead air space makes the most desirable method of building construction. Simple to use, easily adjustable. No skilled labor required. Method has been tried and proven.

Write for complete description of method and its operation, photos showing work done, and costs.

HOLLOW CONCRETE WALL CO.

H. T. FROST, PRESIDENT MITCHELL, SOUTH DAKOTA

MARBLE CHIPS

At Wholesale

R. V. REYNOLDS CO.

1415 Railway Exchange : : Chicago, Ill.

These Booklets Are Easy to Read and Worth Reading

Pamphlet No. 15
gives details of the various types of dragline cableway excavator installations suitable for general dirt-moving operations, brick and tile plants, and so forth.

Pamphlet No. 14
is a handy compilation of data on the dragline cableway excavator method of excavating and conveying sand and gravel, illustrated with many views of typical installations.

Pamphlet No. 12
describes the latest developments in the use of mechanical drag scrapers for handling gravel from hillside, and explains the adaptability of power scrapers for small pits.

Pamphlet No. 11
illustrates practical solutions of various storage problems by use of scrapers and dragline cableways, some of this information being now published for the first time.

Which of the above pamphlets do you want? Send in your request at once.

SAUERMAN BROS. 1139 Monadnock Bldg., CHICAGO

ARROW POWER DRAG SCRAPER

A Real Earth Mover

Operated by two drum hoist. It will do excavating work of all kinds ECONOMICALLY. Grading—Stripping—Delivery of material from pit to plant or bins or for wagon or truck loading. Particularly adapted to hillside deposits or under water. Write for catalog.

L. F. GREEN 907 Lumber Exchange Bldg. Chicago

A Complete Steel Trestle OPEN— Ready for Use.

CLOSED—For Storing or Transporting.

ECONOMY STEEL SCAFFOLDING

is being used by a number of leading Chicago contractors, such as Thompson Starrett Co., R. C. Wieboldt, Blome Sinek, E. W. Sproul & Co., Math Rauen Co., Gerhardt Meyne and many others, who will gladly recommend them to every contractor as a good asset in equipment.

The illustration is of the Mason Horse 4 ft. 6 in. high and 5 ft. 0 in. wide which weighs but 60 lbs., they are sturdy in construction and their compactfulness when folded makes them very easy to handle, transport or store.

A TRIAL ORDER WILL CONVINCE YOU THAT THEY ARE A NECESSITY.

Price $6.00 each, F. O. B. Chicago.

ECONOMY SCAFFOLD CO.

4611-19 West Fulton St. CHICAGO, ILL.

Which Do You Manufacture, Sightly or Unsightly Brick?

Make poured concrete brick, the kind of brick that are used for faced work. You can't get anywhere by calling a dry tamped brick a wet brick. To succeed you must have poured brick.

Our circular explains the difference between the poured and dry tamped concrete products.

MERRILL MOORE CRESTON, IOWA

Concrete Blocks, Bricks Building Trim, Posts, Ornamental Work, Etc.

WHEN FACED WITH

Mica Spar Crystals

IS CHANGED INTO

SPARKLING GRANITE

Beautiful, Artistic and Everlasting

Made in six scientifically milled sizes, extremely hard, sharp and free from dust. Insures strength and beauty. Booklet "Micaspar and How to Use It," with free samples mailed on request.

Crown Point Spar Company, Inc.

101 PARK AVE. NEW YORK

THE *Atlas* MIXER

Represents the best established practice in Concrete Mixer Construction.

Its dependability and simplicity commends it to the contractor who appreciates the importance of uninterrupted service.

The Atlas is made in various sizes and styles. Let us mail you our catalogue.

Send for it today—NOW

ATLAS ENGINEERING CO.

3023 Lisbon Ave. **Milwaukee, Wis.**

P. S.—If you are interested in material handling equipment, let us mail you our ATLAS Wagon Loader, Box Car Loader, Car Unloader, Belt and Bucket Conveyor and Portable Storage Bin catalogue. The catalogue is yours, simply ask for it.

WATER

WE-FU-GO AND SCAIFE

PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

BELTING

"V-B" Balata
"AMPERE"
(Canvas Stitched)
GRIP-ON
(Impregnated Solid Woven)

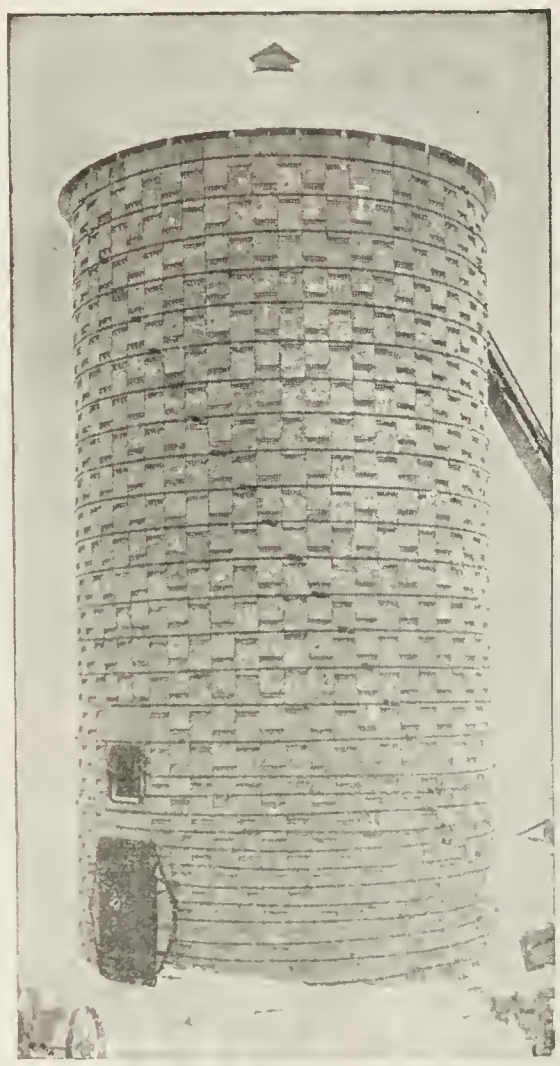
Write for Prices, Discounts and Samples

VICTOR BALATA & TEXTILE BELTING CO.

Factory: Easton, Pa. Main Office: 38 Murry St., New York
Stores: 167 N. Market St., Chicago and 85 Purchase St., Boston

CONVEYOR BELTS A SPECIALTY

THE IREY SUCCESSFUL AND ECONOMICAL METHOD OF CONSTRUCTION



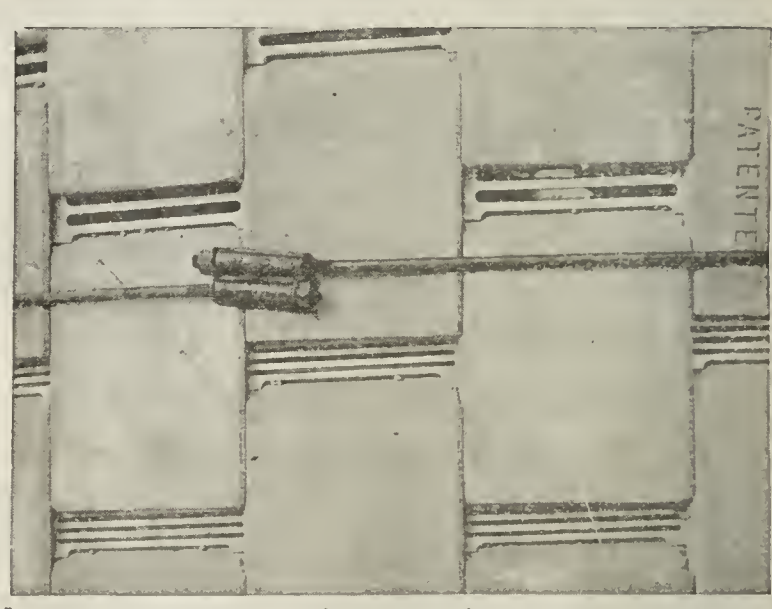
Irey cement stave corn crib on the farm of W. W. Walters, Wiota, Iowa—a fireproof, ratproof, and permanent structure.

Gives every rural contractor an opportunity to take advantage of the large demand for better Corn Cribs. Every farmer is a prospect for a concrete crib.

THE IREY PATENTED VENTILATED CONCRETE STAVE CORN CRIBS

are so built as to admit air and exclude rain and snow.

Making the staves is simple. Erection rapid. Every farmer is a booster. Any concrete man can establish a good paying business manufacturing and erecting these cribs. Investigate our proposition. Write for details.



Irey cement stave corn crib construction combines permanence and ease of operation with ample circulation through the contents.

CONCRETE PRODUCTS CORP.
WEST LIBERTY, IA.

For FIRE BRICK and DUST
Specify
CRESCENT QUALITY
THE UTMOST IN
FIRE CLAYS

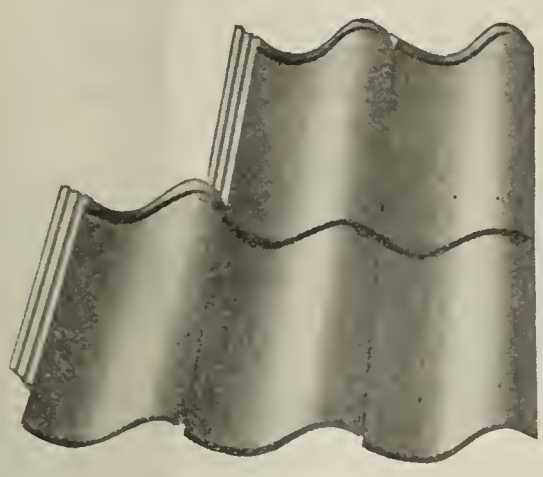
CRESCENT REFRACTORIES CO.
Curwensville, Clearfield Co., Pa.

FOR SALE

3½-ton White truck, Morand cushion wheels, mechanical power hoist, steel dump body, 28 in. deep, 5 ft. wide and 10 ft. long, two way end gate, detachable stake sides, enclosed cab, Prest-o-lite headlight. First class running condition, has been used 12,000 miles and can be seen at 1133 East 47th street.

TERMS TO RESPONSIBLE PARTIES

E. A. Keappler Boarding & Commissary Co.
618 W. Madison St. Chicago, Ill.



SPANISH TILE

The U. S. Champion Tile

Is a perfect and everlasting concrete roofing of artistic beauty in any color desired. Easily made and applied by anyone.

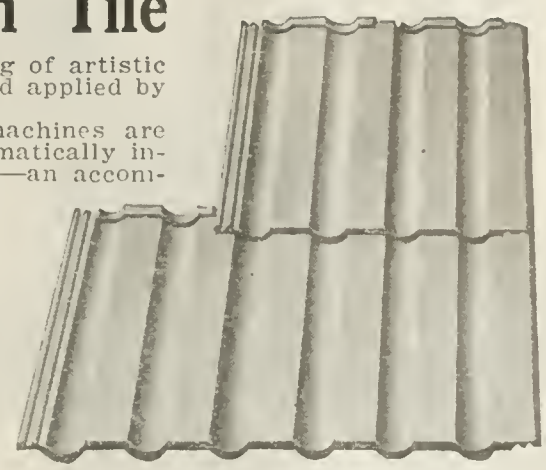
Our newly improved and patented tile machines are provided with a new device that makes automatically interlocks on both ends and sides of our tiles—an accomplishment of immense value for the roofing tile problem and characteristic for our tiles only.

Buy the U. S. CHAMPION TILE MACHINES for making FRENCH or SPANISH TILE. They help progressive builders and concrete products manufacturer cutting down the high building material costs besides giving large returns from a small investment.

Write for description and prices.

L. HANSEN CO.

3617 East 23rd St. Kansas City, Mo.



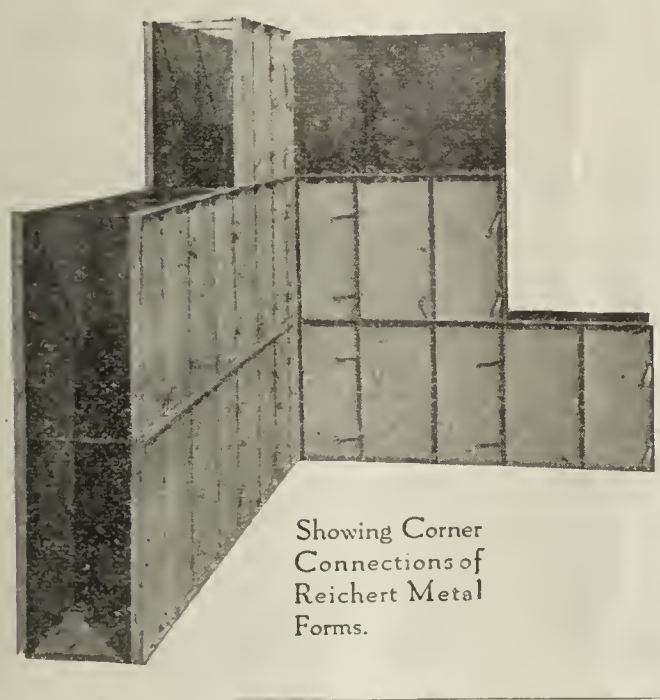
FRENCH TILE

Better Work in Less Time

REICHERT Adjustable Steel Molds will enable you to do better work on Walls and Foundations. Their perfect alignment and close connection guarantees a SMOOTH SURFACE over the entire area of the job.

REICHERT Adjustable Steel Molds will save you valuable time. The Improved Locking Device operates easily, no hammering necessary. Unskilled labor, with brief instruction, can assemble and operate with perfect results.

REICHERT ADJUSTABLE STEEL MOLDS



Showing Corner Connections of Reichert Metal Forms.

are standardized, all parts interchangeable, and PERMANENT. One set of Forms will enable you to SAVE TIME AND MONEY on a wide range of jobs, FOR MANY YEARS.

With REICHERT Adjustable Steel Molds in use, you can bid lower on contracts, beat competition, and still maintain the same margin of profit—or actually increase it.

GET THE FACTS. Write us for catalog and full information.

Reichert Metal Concrete Forms Company

1188 Weil Street, Milwaukee, Wisconsin

THE POLK SYSTEM

All-Steel Machines for All Kinds of

Circular Concrete Construction

We contract grain storages.

Polk Genung Polk Company

521 Occidental Bldg.
Indianapolis, Ind.

Fort Branch,
INDIANA

Henry Heil Chemical Company

210 to 214 South Fourth Street, ST. LOUIS, MO.

We make a specialty of supplying cement works with

Chemical Apparatus, Chemicals and Reagents

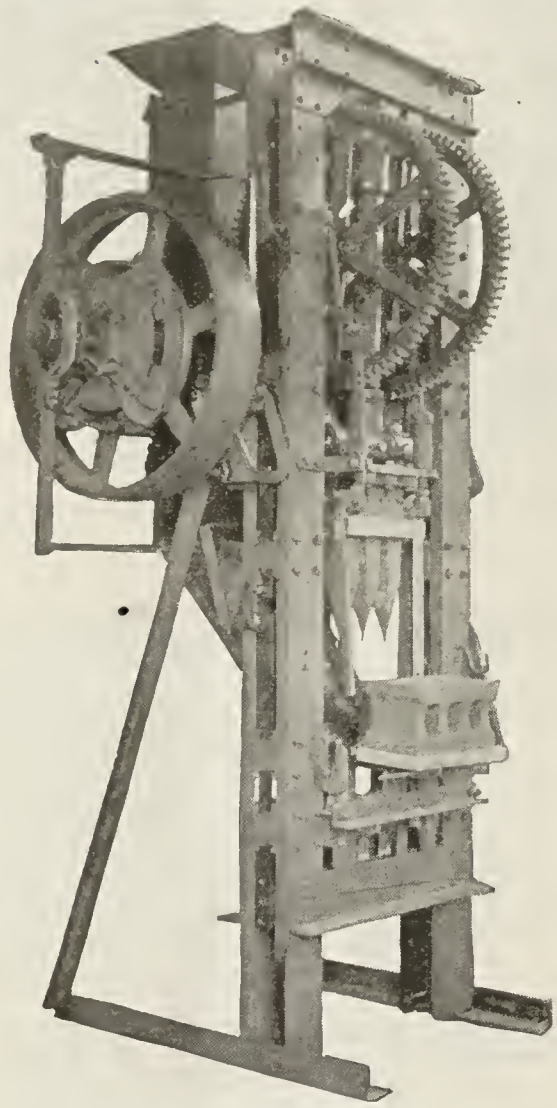
Gilmore's Needles, Cement Moulds, Vicat Apparatus, Schumann's, LeChatelier's and Jackson's Specific Gravity Apparatus, Etc.

Pyrometers, Calorimeters

High Grade Goods Only

Satisfaction Guaranteed

POST ECONOMY PUNCH



Introducing an absolutely new and original method of manufacturing concrete blocks. ALL AUTOMATIC. Each stroke of the plungers makes and delivers a complete block—a block which is dense, true and easy to lay. A guaranteed output of over 2000 blocks per day with four men. No other equipment will give you this production per man.

We also manufacture the following well known machines:

The Hobbs Down Face Block Machine

The Anchor Continuous Air Space Block Machine

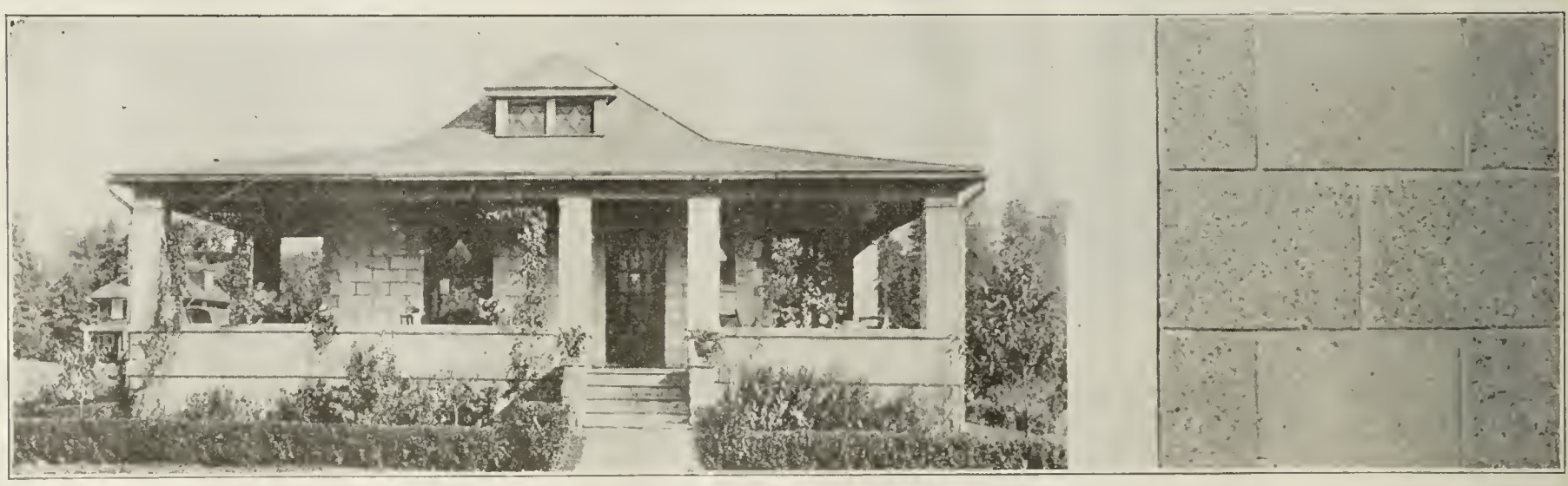
The Anchor Automatic Tamper made to operate over any type of block, brick or stave machine.

The Anchor Batch Mixer—a mixer designed for concrete products plants.

Let us tell you more about this reliable line of equipment.

The Anchor Concrete Machinery Co.

Home Office: Rock Rapids, Ia. Branch: Columbus, O.



Building Material of Beauty

Minimum absorption, maximum strength, light and easy to lay and produced in style, shape and design to meet any architectural requirements.

INEXPENSIVE **PERMANENT** **POPULAR**

Under one operation the stone are veneered with granite, marble or other natural products and sprayed as they come from the machine, producing a Reconstructed Stone in natures own beauty.

AN OPPORTUNITY

If you are interested in producing a high class building unit of standardized dimension, and desire to invest in a Real Manufacturing Business, WRITE US NOW.

HYDRAULIC RAMMING CONCRETE STONE MACHINERY

LITTLE FALLS **NEW JERSEY**

NO OTHER CLUTCH HAS ALL THESE ADVANTAGES

Plamondon Disc Type Friction Clutches have every known feature that makes toward efficiency, economy and durability in clutches. For the most economical transmission and distribution of power and easy control of the same, there can be no logical choice but that of the

PLAMONDON DISC TYPE CLUTCH

Plamondon Clutches defy the most adverse conditions Their absolutely dustproof construction renders them particularly suitable for use in cement mills, etc.

We have a 57 years' service record for this clutch.

Write for our new catalog No. 59

A. PLAMONDON MFG. CO.
5301 So. Western Blvd.
CHICAGO, ILL.

We manufacture Spur Gears, Bevel Gears, Miter Gears, Spur Mortise Gears, Bevel Mortise Gears, Miter Mortise Gears.

Cut Gears

Spur, Spiral, Bevel and Worm
Steel and Rawhide

Accuracy and Prompt Delivery

When you want a gear cut you want it **quickly,**—we emphasize our promptness without sacrificing accuracy.

Ganschow Cut Gears

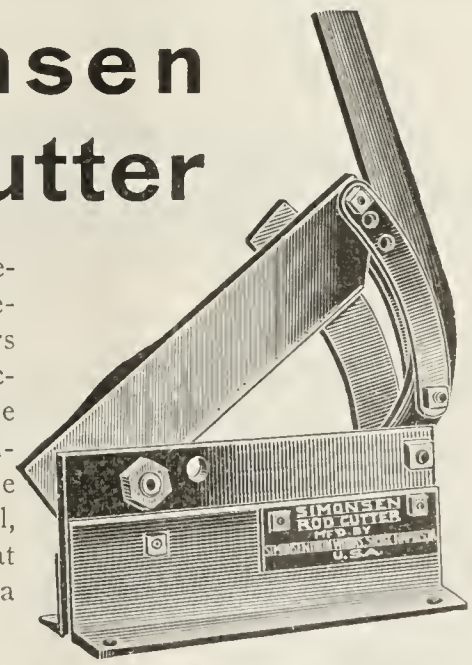
stand first in accuracy—perfect mesh—silent operation and the quality that counts for long service.

Estimates furnished from drawings and specifications.
WRITE FOR CATALOG.

WILLIAM GANSCHOW CO.
1003 W. Washington St. - CHICAGO

Simonsen Bar Cutter

Is designed especially to meet the requirements of builders in concrete construction needing a portable shear for cutting reinforcing bars on the job. It's a practical, low-priced shear that will pay for itself in a short time.



NON-BREAKABLE STEEL BODY

Cutting Jaws are of the "welded in" type, our own patented design. Lower or stationary jaw has a keen edge of hardened tool steel and is practically indestructible. Upper jaw does the actual cutting and is hinged at rear end on a heavy case hardened steel pin. It's reinforced.

Made in three sizes. No. 10 weight 75 lbs. Capacity ¾ in. round or ½ in. square twisted. No. 11 weight 125 lbs. Capacity 1 in. round or ¾ in. square twisted. No. 12, weight 175 lbs. Capacity 1¼ in. round or 1 in. square twisted. Shipped set up complete with suitable lever.

Ask your supply dealer or write us for full information.

SIMONSEN IRON WORKS, Manufacturers
Sioux Rapids Iowa, U. S. A.

For Better Concrete, Stronger Mortar—use HYDRATED LIME

Increases Concrete Density

By virtue of its ability to fill the voids, Hydrated Lime increases the density of concrete. The mass becomes more watertight—practically impervious to water. Honeycomb and other structural weakness are also prevented. Hydrated Lime promotes intimate contact of the concrete mass with the forms and produces smooth, pleasing exterior surfaces.

Other Reasons Why You Should Specify and Use Hydrated Lime

because

1. Makes the mixing of Portland cement concrete more easy, inasmuch as it lubricates the sand grains and coarse aggregates.
2. Renders the concrete mix plastic enough to flow freely and smoothly with a minimum of excess water.
3. Makes the concrete easier to work after it is deposited in the forms, thus eliminating labor usually required for spading and tamping against the forms.
4. Eliminates the tendency toward cracking, because it minimizes alternate expansion and contraction due to moisture changes.
5. Promotes uniformity of the mass concrete by producing a colloidal or jelly-like medium through which the rock and matrix do not segregate, thereby producing a stronger concrete.
6. Materially and directly increases the ultimate compressive strength and efficiency of the concrete, by virtue of its ability to hold water in mechanical suspension and thus supplying the necessary moisture required by Portland cement in order properly to set and attain its maximum strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

Ladd Lime & Stone Co., Cartersville, Ga.

Marblehead Lime Co., Chicago—Kansas City

Louisville Cement Co., Louisville, Ky.

Lee Lime Co., Lee, Mass.

White Marble Lime Co., Manistique, Mich.

Glencoe Lime & Cement Co., St. Louis, Mo.

Ste. Genevieve Lime Co., St. Louis, Mo.

Rockland & Rockport Lime Corp. New York—Rockland, Maine—Boston

Hunkins-Willis Lime & Cement Co., St. Louis, Mo.

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

National Lime & Stone Co., Carey, Ohio

Ohio Hydrate & Supply Co., Woodville, Ohio

Woodville Lime Products Co., Toledo, Ohio

Merion Lime & Stone Co., Norristown, Pa.

American Lime & Stone Co., Tyrone, Pa.

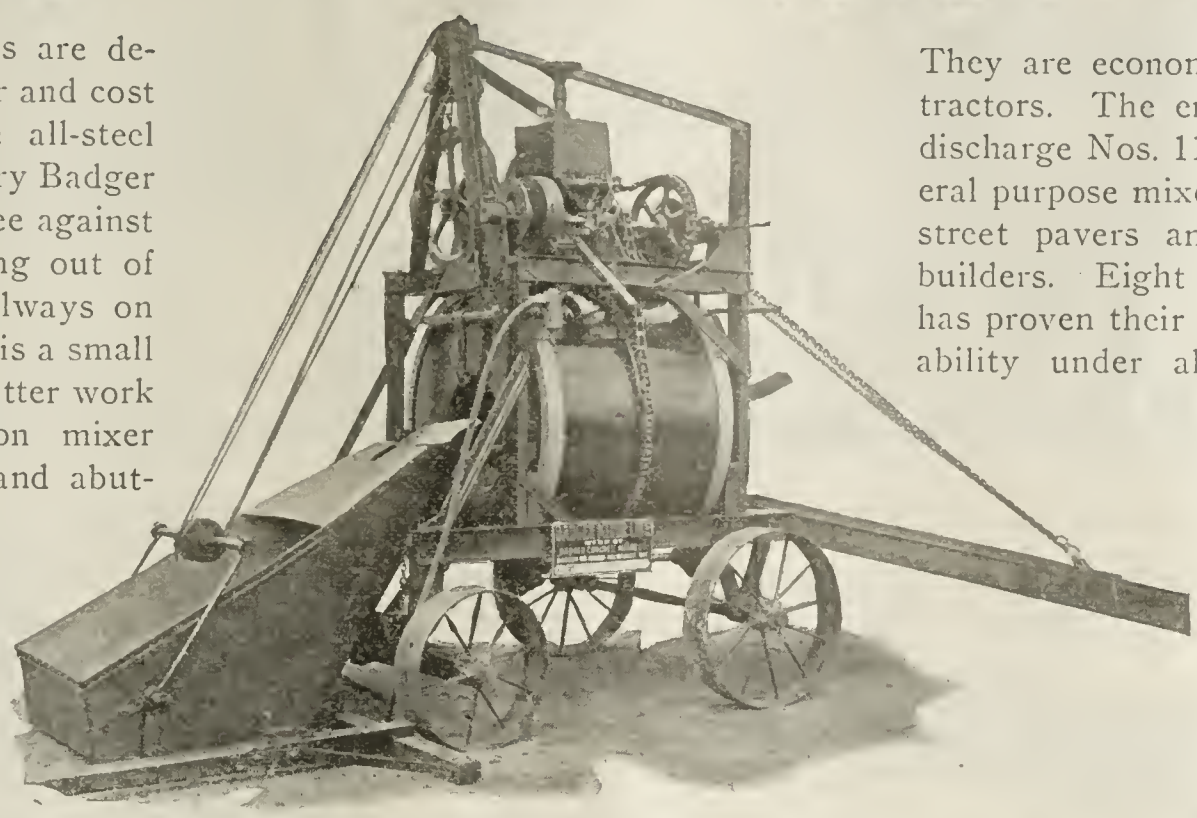
Riverton Lime Co., Riverton, Va.

Vermarco Lime Co., West Rutland, Vt.

Western Lime & Cement Co., Milwaukee, Wis.

BADGER MIXERS

The Badger Mixers are designed to save labor and cost of operation. The all-steel construction of every Badger Mixer is a guarantee against breakage or wearing out of parts. They are always on the job, whether it is a small mixer on curb or gutter work or the construction mixer upon foundations and abutments or the alley and street paver. Their light weight and durability has made a distinctive reputation for the Badger Mixer.

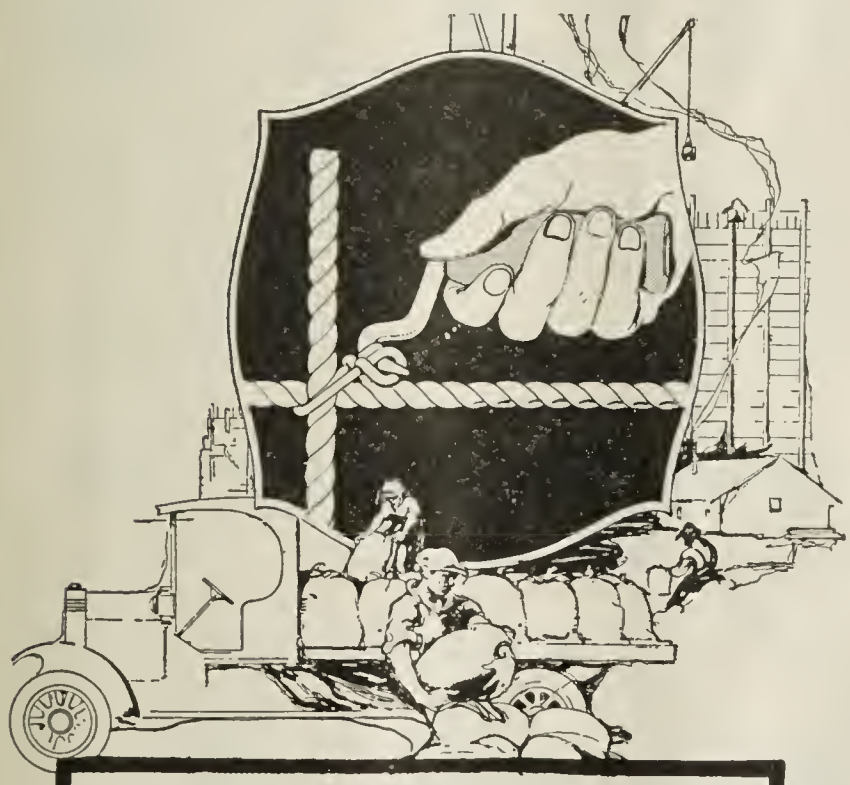


They are economical to the contractors. The end load and end discharge Nos. 11 and 15 are general purpose mixers and alley and street pavers and country road builders. Eight years of service has proven their absolute dependability under all conditions of concrete work.

Write for our attractive prices.

The ~ Badger ~ Mixer Line

BADGER CONCRETE MIXER CO., 13th Floor MAJESTIC BLDG. **MILWAUKEE, WIS.**



Cut Your Rod Tying Cost —Use the Bates System Free Trial

The cost of your rod tying work is too high unless you now use the Bates Wire Rod Tying System. The Bates saves you time, money, and a novice becomes an expert "with one twist of the wrist." More rods tied in less time means money saved.

Write today for your Bates FREE Trial Rod Tying Outfit

The Bates FREE Trial Rod Tying Outfit containing one "Simplex" Hand Tying Tool and 10 each of 4, 5, 6 and 7-inch Bates Wire Ties will be sent on receipt of your signed agreement to use this Rod Tying Outfit on your work for 15 days and then send us $1.50 or return the tool. **These trial ties cost you NOTHING.**

BATES VALVE BAG COMPANY

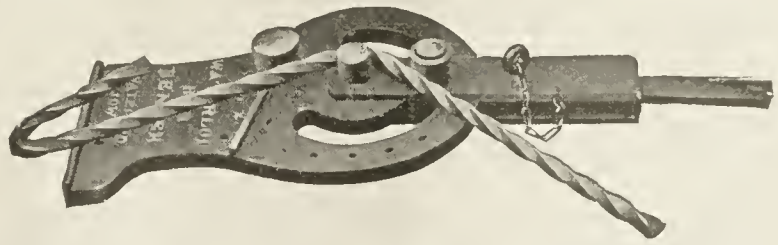
7330 South Chicago Ave., Chicago, Ill.

110 Great Portland St., London, W. 1., England

BATES SYSTEM FOR FILLING & CLOSING BAGS

Contractors can't afford to be without

The Waterloo Bar Bending Machine



It's made in 2 sizes, and is guaranteed to bend bars as follows: No. 2 bends cold reinforcing bars including 1⅛ in. round or square. Price $30.00. No. 3 bends cold reinforcing bars including 1¼-in. round or square. Price $35.00.

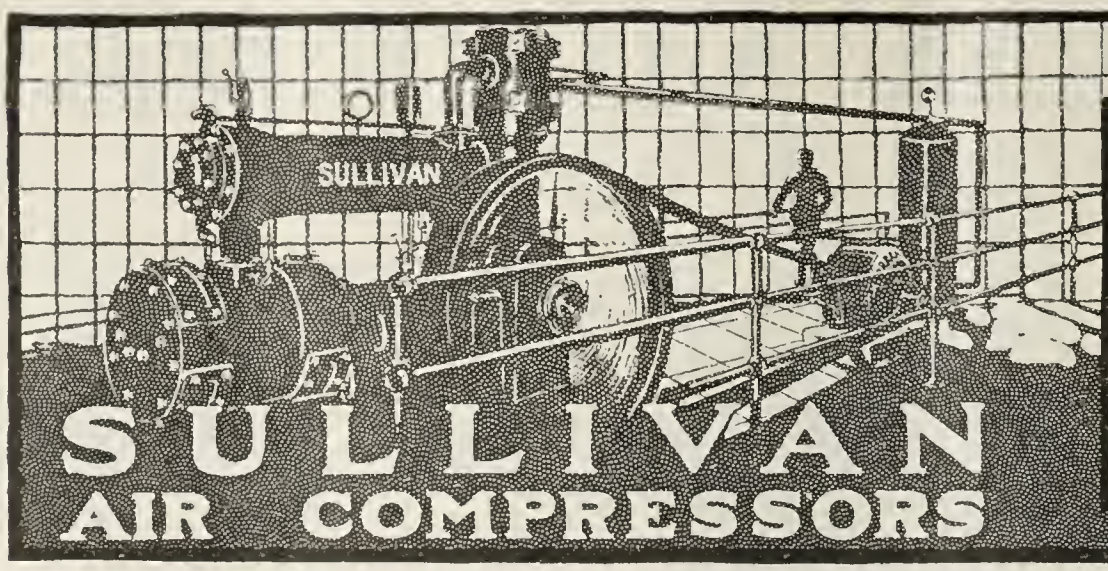
Bends bars to various angles desired. Has a detachable handle 7 feet long for convenience in handling.

Waterloo Construction Co., Waterloo, Iowa

SAVE CEMENT SACK LOSS

Bale your sacks up tight and right. Keep them baled up all the time. If you have one of our handy sack balers you will do this. We manufacture a cleaner that cleans. Write us for prices and further information.

HANDY SACK BALER CO
620 S. 2d St.
CEDAR RAPIDS IA.



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AIR COMPRESSORS

The exact balance of the horizontal and vertical moving parts in

Angle Compound
Air Compressors

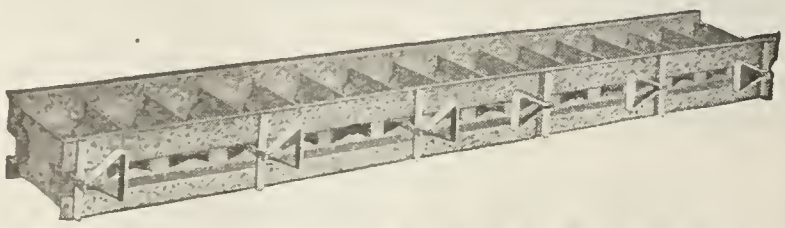
secures to their owners lower ultimate cost per unit of air compressed than is obtainable with any other Compressor of equivalent capacity.

Built in single units to 1300 cu. ft., in twin units to 2800 cu. ft. for belt or direct motor drive.

New Bulletin 1777-B

SULLIVAN MACHINERY CO.
418 Gas Bldg., Chicago

A REAL PROFIT MAKER



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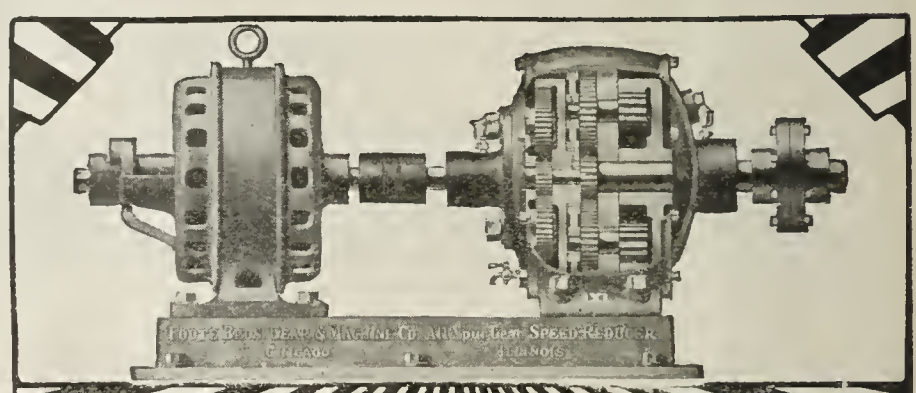
Produce with extreme economy and speed the building stone that sells fastest. It is the final word in the manufacture of slush poured concrete block, plain or faced. Why limit your profits by using a system less perfect. Get behind the FLEXO-CRETE blocks and make more money out of your time and investment.

The moulds are galvanized and rust proof. All parts are interchangeable. Simple, Substantial, Self squaring and easily handled.

Flexo Moulds are manufactured under Patented Rights.

FLEXO CONCRETE MOULD CO.
216 Masonic Temple CEDAR RAPIDS, IA.



FOOTE SPEED TRANSFORMERS

Write to us, state the conditions that exist in your plant, and get the advice of our engineering department.

FOOTE BROS. GEAR & MACHINE CO.,
228-238 N. Curtis St. Chicago, Ill.

BALLS

Forged steel balls of special analysis steel from 2″ to 15″ in dia. carried in stock. Can't be excelled.

BALL MILL PLATES
CRUSHER SHAFTS
GRIFFIN MILL SHAFTS
GRIFFIN MILL CONVEX SEATS
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PIPE FLANGES
For High Pressure Work
STEAM SHOVEL, TRUCK AND CAR AXLES

Hammer and Hydraulic Press Forgings of all Kinds

We make quick service a feature of our business

TIOGA STEEL & IRON CO.
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First Class Silex Slabs

for lining of tube-mills for grinding of Cement, Clinker, Kaolin, Phosphate, Limestone, Quartz, Trap, Coal, Ores, Gypsum, Feldspar, Sand, etc.

Have successfully passed some of the most severe tests. Long life and moderate price. Immediate shipment on stock sizes. Write for prices.

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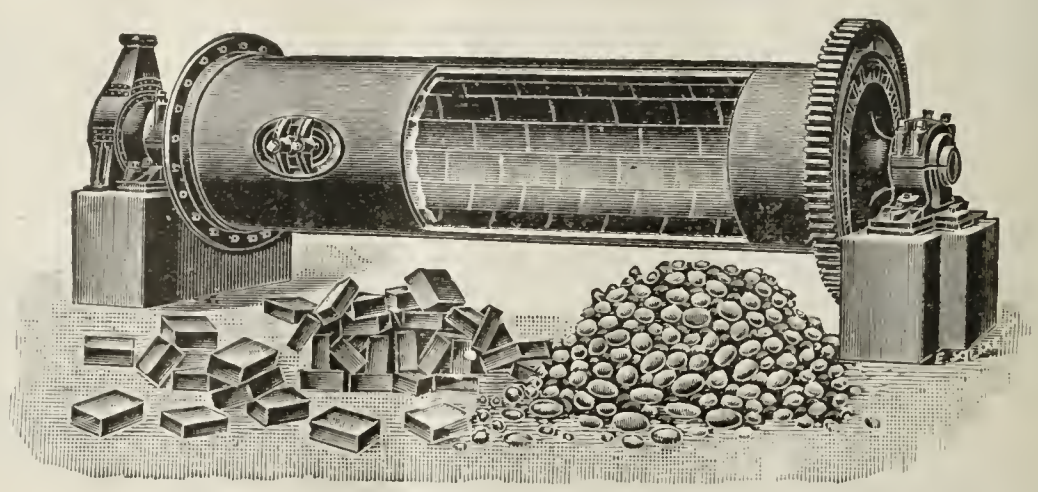
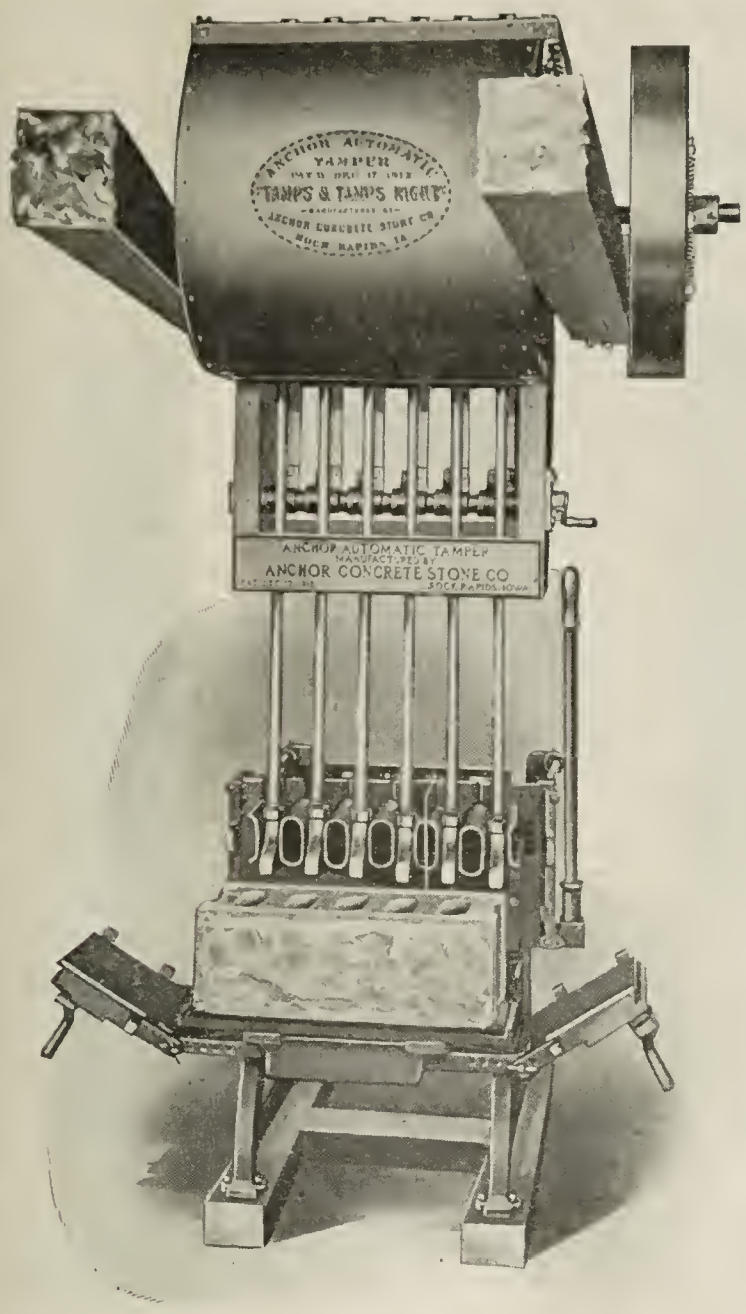
La-Ferte-sous-Jouarre (S-&-M)
(France)





THE HOBBS BLOCK MACHINE

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ANCHOR AUTOMATIC TAMPER

will make money for you if you will give them a chance. The finest faced blocks in the world can be made on the Hobbs machine and yet this same machine will make plain blocks very rapidly.

The Anchor Automatic Tamper is made to operate over any type of Block, Brick or Stave machine with satisfaction absolutely guaranteed.

We also manufacture the following well known machines:

The Post Economy Punch

The Anchor Continuous Air Space Block Machine

The Anchor Batch Mixer—a mixer designed for concrete products plants.

Let us tell you more about this reliable line of equipment.

The Anchor Concrete Machinery Co.

Home Office: Rock Rapids, Ia. Branch: Columbus, O.

for facing concrete work

FOR the stucco suburban home—the modern public utility plant and factory—the bank and office building—first call is for Middlebury Terrazzo for facing concrete work.

Middlebury Terrazzo has all the appearance of solid marble—with all its advantages and at a material saving in price.

Made from Middlebury White and Crême Statuary Marbles, it is furnished, carefully graded to size, in either dust, No. 1, 2 or 3.

Send today for free samples and prices

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Steel Reinforcing Bars

Three grades: open hearth steel (new billet stock), "medium" and "hard" grade, and rail carbon steel (re-rolled). Both theory and practice agree on the design. Rounded corners prevent splitting of the concrete. Bending, fabricating and setting are easily done with these bars.

Sizes 3/8 to 1¼ inch. Lengths up to 85 feet. Shipments can be made promptly

Inland Steel Company

First National Bank Bldg. CHICAGO

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BRANCH OFFICES:
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Laclede Bars for Reinforcing Concrete

Many buyers now take advantage of facilities at mill by ordering bars cut to length, bent to shape, and tagged—ready for placing.

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ROUND—SQUARE—FLAT—SQUARE TWISTED

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We can meet your Reinforcing Steel Requirements. This means not only quick shipment from the mills but co-operative service for rapid transportation. If you want to know just what your exact cost will be, send us the Blue Prints and we will give you a lump sum bid on all the steel sheared to lengths, bent to specifications and delivered to the job,

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Concrete Roads must be reinforced

It is demonstrated beyond doubt that to make concrete roads proof against heavy motor traffic, weather and time, a fabric of steel must be incorporated in the concrete.

Several great states have so ruled.

American Steel & Wire Concrete Company's Reinforcements fulfills every engineering requirement.

Send for our book on road building.

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1 CATERPILLAR TRACTOR, Holt, 75 H.P., 4-cylinder, 550 R.P.M., gasoline engine.

1 CATERPILLAR TRACTOR, Cleveland, Model "H" Gasoline Engine.

1 CRANE, McMyler, Coal Handling—McMyler Interstate Company, special type P, 100′ Rad. Differential Gear Drive Steam Power, 4 trucks, 3 ft. gauge, traveling on track at 19 ft. C. to C.

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1 CONCRETE MIXER, Austin No. 9, 7 H.P. gasoline engine.

1 CONCRETE MIXER, Ideal No. 264, 4 H.P., capacity 7 cu. ft.

10 CORLISS ENGINES, Allis Chalmers, simple non-condensing 18″x36″, 250 H.P., developing 180 R.P.M. These engines are new and ready for immediate delivery.

LOADERS, Haiss, gasoline engine driven.

CONVEYORS, all kinds.

Sales Department,

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Nitro, West Virginia

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If you are needing more track BUY NOW.

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We own and offer NEW & RELAYING RAILS for prompt shipment. All weights and tonnages.

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No. 1—East Chicago, Indiana.
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1—Centrifugal Pump, Motor and Base. Direct connected, capacity 4,000 G. P. M., against 150 ft. head.

800 ft. 14″ Cast iron flanged pipe.

1 15″ Flexible rubber pipe 16′ long.

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1 15″ Foot valve flanged.

2 14″ Tate Valves.

1 14″ Tee.

3 14″ Ells.

1 Reducer 16″ to 14″.

1 Set Crushing Rolls 24″ Dia. x 30″ length.

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New Storage Tanks in Stock

All full ¼-inch boiler plate, with manhole and openings to suit your needs.

575 gallons		52″ x 5′ 0″
1,000 gallons		50″ x 10′ 0″
1,000 gallons		64″ x 6′ 0″
2,000 gallons		64″ x 12′ 0″
5,000 gallons	10′	6″ x 12′ 0″
6,000 gallons	8′	3″ x 15′ 0″
8,000 gallons	10′	0″ x 12′ 0″
10,000 gallons	10′	0″ x 17′ 0″
10,000 gallons	7′	10″ x 30′ 0″
12,000 gallons	7′	10″ x 35′ 0″
12,000 gallons	10′	5″ x 18′ 0″
15,000 gallons	10′	5″ x 24′ 0″
20,000 gallons	10′	6″ x 30′ 0″
24,000 gallons	10′	6″ x 36′ 0″

FABRICATED STEEL PRODUCTS CORP.

Box 4040 Leetonia, Ohio

FOR SALE

Some bargains in first class used tanks.

190—4 ft. x 6 ft. long, ¼-in., 584 gal. capacity	$ 85
3—4 ft. 6 in. x 24 ft. long, ½-in., 2853 gal. capacity	175
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12—8 ft. 6 in. x 18 ft. long, 5/16-in., 7640 gal. capacity	450
7—10 ft. 6 in. x 16 ft. 6 in. long, ⅜-in., 11200 gal. capacity	525
3—6 ft. x 6 ft. long, ½-in., 1269 gal., for 250 lbs.	275
2—5 ft. 6 in. x 12 ft. long, ¾-in., 2132 gal., for 350 lbs.	550
1—25 ft. x 14 ft. high, ⅜ and ¼-in., 51,000 gal., ¼-in. roof	850

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Tank Dealers

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SECOND-HAND MACHINERY AND EQUIPMENT

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One No. 2½ Kent Continuous Stationary Mixer, capacity 8 cu. yds. per hour. Rebuilt at Factory, good as new. Price $225.00. Regular price $450.00.

THE KENT MACHINE COMPANY
Kent, Ohio

Air Compressors

2—710 C.F.M. Class WJ3 Sullivan Angle-Compound Belt Driven Air Compressors. Practically good as new. Immediate shipment.

A. McMILLAN
628 Monadnock Block CHICAGO, ILL.

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One—Westinghouse 780 KVA (625 KW) Turbine Outfit.
One—Westinghouse Leblanc Condenser.
One—16 KW Exciter outfit.

All in first class condition. For full particulars address

Phoenix Portland Cement Co., Nazareth, Pa.

FOR SALE

CRUSHERS

1—No. 4 and 1—No. 6 Allis Chalmers Gyratory. First Class Shape.

HOISTS

3—8¼x10 Lidgerwood D. C., S. D. Heavy Duty.

Dump Cars, Locomotives, Rails.

Mid-Continent Equipment & Machinery Co.
Security Bldg., St. Louis, Mo.

Contractors' Equipment
From the $87,000,000 Old Hickory Plant

4 7x10 D.D. Hoists, with Boilers.
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2 8x10 D.D. Hoists, with Boilers.
8 6 H.P. Stover Gasoline Engines.
3 10 H.P. Novo Vertical Gas Engines.
1 3 H.P. F. M. Type 2.
1 5 H.P. F. M. Type 2.
1 15 H.P. Lambert Horizontal.
60 Diaphragm Pumps, all sizes, Hand and Power Driven.
6 Compressors.
11 Windlasses.
15 Winches.
7 Clam Shell and Drag Line Buckets.
5 Bottom Dump Cement Buckets.
3 Jeffrey Loaders.
Mixers, Steam and Gasoline Driven Wheelbarrows.
Concrete Buggies.
2000 tons 67½ lb. Rail, Russian Section.
2000 tons 80 lb. Rail, A.S.C.E. Section.
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3 2-6-0 Locomotives.
36 Storage Battery Locomotives, 36-in. gauge.
5 Dinky Engines.
10000 Steel Cots, single and double deck.
30000 Mattresses, single and three-quarters.
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Thousands of other articles.

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Bucyrus Steam Shovel No. 1666, Model 70C. Price $10,000.00.

Marion Steam Shovel No. 3158, Model 28. Price $5,200.00.

Marion Steam Shovel No. 3573, Model 28. Price $5,500.00.

All regular specifications complete. First class working conditions. Operating continually and can be seen in operation. Prices f.o.b. cars Mexico, Mo., and subject to prior sale.

A. P. GREEN FIRE BRICK CO.
Mexico, Missouri

FOR SALE

2—Heine Watertube Boilers, 409 hp. each.

For further particulars address

Phoenix Portland Cement Company
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CEMENT COST ACCOUNTANT

Wants position. Familiar with all systems and all branches of cement accounting. Have installed Portland Cement Association system in five plants. Have been resting in Southern California; now ready for any big work. J. J. King, Box 835, Route 5, Los Angeles, California.

WANTED

A man thoroughly familiar with the manufacture of cement blocks and bricks, to take charge of a new plant in a fast growing town, one able to invest $500.00, good references required.

Address Box 247, c/o Cement & Engineering News, 22 Quincy St., Chicago.

POSITION WANTED

Competent graduate cement chemist. 11 years' experience in both wet and dry process. Desires position with good concern as chief chemist. Can furnish best references. Address A. F., c/o Cement & Eng. News, 22 Quincy Street, Chicago. Ill.

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By practical Cement Mill Superintendent and Construction Engineer. 20 years experience wet and dry plants, can furnish A-No. 1 references and am employed at present, but desire a change of location. Address Box 201. Care of Cement & Engineering News.

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To hear from a cement plant manager who wants an assistant that knows the business and how to make it pay. Address "Experienced," c/o Cement & Engineering News, 22 Quincy St., Chicago.

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Cement Mill Superintendent, 15 years' experience, is open for a position as superintendent with a good company; can furnish A-1 references. Address Box 527, c/o Cement & Engineering News, 22 Quincy street, Chicago, Ill.

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2—5'6"x20' Schmidt Tube Mills Complete. For full particulars address **Phoenix Portland Cement Co., Nazareth, Pa.**

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2 Gasoline Locomotives, Model E, 7½ ton, engine 6"x7" P. O. M. 15233, 36" gauge, George D. Whitcomb Company, manufacturer.

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CHARLESTON INDUSTRIAL CORPORATION
NITRO, WEST VIRGINIA
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STANDARD RAIL & STEEL CO.

IRON & STEEL SCRAP — SRS — RAILS, BILLETS & BARS

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Re-laying Rails

all weights and sections

Also Spikes, Bolts and Accessories. Rails cut to lengths for Buck Stays, Bracing, etc.

Punchings for Cement Crushing

RAILS NEW AND RELAY

Immediate Shipment

FROM CENTRAL LOCATION

500	Tons	40-lb.	Relay	1000	Tons	75-lb.	Relay
500	Tons	56-lb.	Relay	200	Tons	80-lb.	Relay
500	Tons	60-lb.	Relay	1000	Tons	85-lb.	NEW
300	Tons	70-lb.	Relay	1000	Tons	90-lb.	NEW

WITH BARS

WE HAVE ON HAND AT OUR YARD—All sections of light rails, new and relay, for immediate shipment.

Mid-Continent Equipment & Machinery Co.
Security Building, St. Louis, Mo.

Locomotives Cars Shovels Tanks

FOR SALE

2 RAYMOND 8-ft. tubular dust collectors complete with 18-ft. cloth tubes. **One Brand New. One Used.**

Rockland & Rockport Lime Corp., Rockland, Me.

FOR SALE

One 6 H.P. "Z" Fairbanks-Morse gas or kerosene engine, horizontal hopper cooling. Excellent condition. Used only 30 to 50 days. Also 3-6 Fairbanks pulley pump mounted on skids and a good belt ready to run.

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$100,000 stock to pick from at bargain prices.

Satisfy yourself, write, wire or phone us. Our repair shop most up to date.

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Probably more used electric motors than you will find in any one place in America are available for you here—our works are headquarters for buying, exchanging, selling, renting and repairing same—we believe in quick sales—and make prices to sell quickly.

Send for our Monthly Bargain Sheet showing present stock and net prices.

Established 1893
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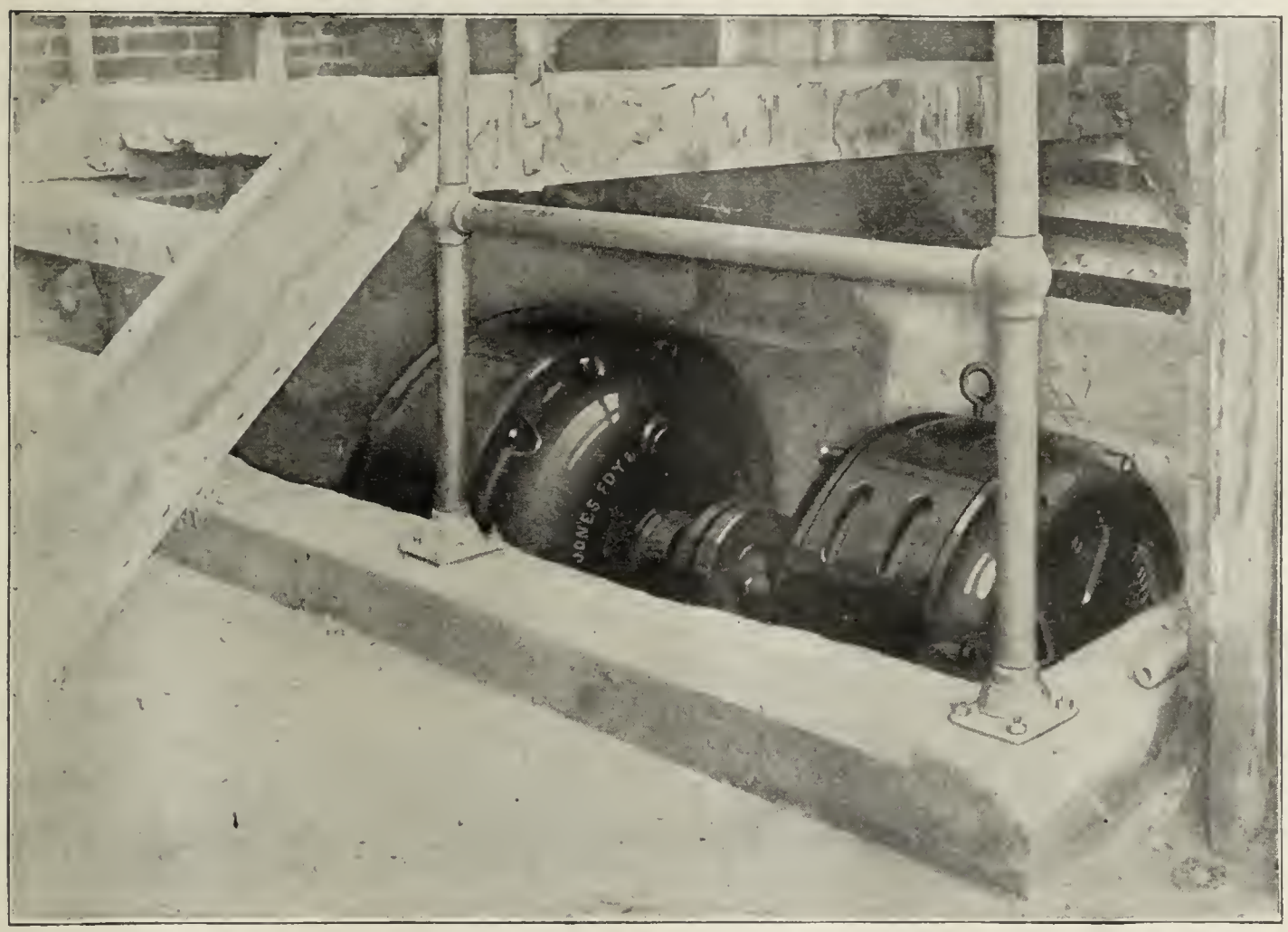
Every machine sold
is overhauled
"like new"



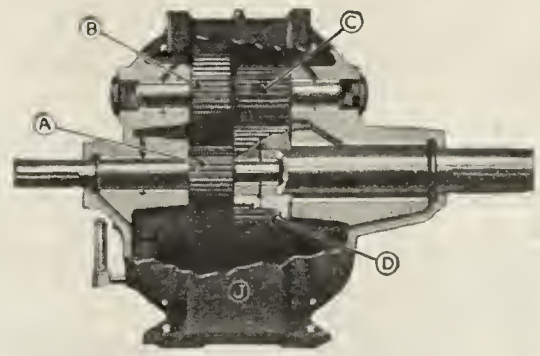
JONES SPEED REDUCERS

Place them anywhere. They are dust-proof and oil-tight. They do away with extensive belting.

The Jones Spur Gear Speed Reducer represents a tangible saving by eliminating excessive belting, pulleys, slide-rails, etc.

Once installed, it needs no further attention beyond an occasional supply of oil, which is distributed throughout the gearing by the splash system.

It lasts a lifetime. Its maintenance costs are negligible. It is encased in a durable iron housing, which renders it safe, oil-tight, dust-proof and tamper-proof. Write today for Reducer Bulletin.



A—Pinon meshes with and drives three gears B
B—Gears are mounted integral with the three pinions C.
C—Three pinions mesh with and drive slow speed gear D.

W. A. Jones Foundry & Machine Co.

4406 West Roosevelt Rd., Chicago **20 Murray St., New York**

MANUFACTURERS OF CAST IRON PULLEYS, GEARS OF ALL KINDS, COUPLINGS, LEMLEY FRICTION CLUTCHES, PILLOW BLOCKS, HANGERS, SPEED REDUCERS AND GENERAL POWER TRANSMISSION MACHINERY

JONES

SPUR GEAR SPEED REDUCERS

CEMENT AND ENGINEERING NEWS

with which Gravel & Stone Magazine is Incorporated

22 Quincy Street, Chicago.

(PUBLISHED MONTHLY)

William Seafert, *Publisher and Editor*

J. F. Waldron, *Advertising Manager*

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Send in your remittance for renewal promptly. Your name will be dropped from our mailing list after second notification.

Advertising copy or changes in ads. must be in this office by the 25th of each month, as hereafter our magazine will appear on the 5th of the following month

Advertising Rates Sent on Application

Vol. 33 CHICAGO, July, 1921 No. 7

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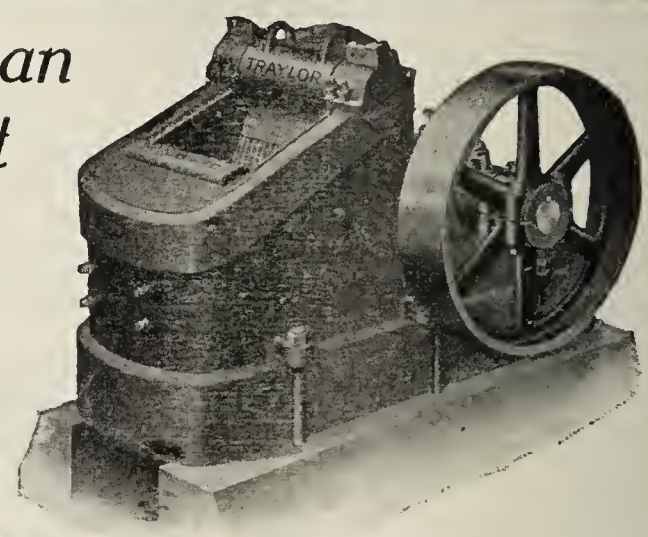
Traylor "Bulldog" Jaw Crushers Mean a Saving at Any Crushed Stone Plant



One method of designing crushers is to make them so massive throughout that it is practically impossible for them to be subjected to strain. Yes, they crush but the cost of operation is terrific.

Traylor Engineers strove to design the lightest yet the strongest crusher possible, that's why the frame of every "Bulldog" Jaw Crusher has a steel band shrunk on it top and bottom and all are equipped with the "Bulldog" Toggle system, the pitman of which is by far the lightest yet strongest of its kind being; made of wrought-steel tension members.

And it's this fine balance of weight and strength that makes the "Bulldog" crusher so economical to the user. Ask your neighbors about the power costs of their "Bulldog" Crushers.

TRAYLOR ENGINEERING & MFG. COMPANY, Allentown, Pa.

New York *Chicago* *Pittsburgh* *Los Angeles* *Spokane*

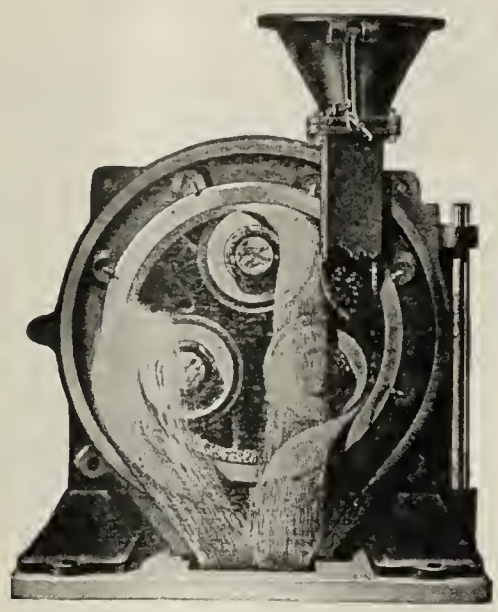
Truck and Tractor Division, Cornwells, Bucks Co,. Pa.

For Immediate Delivery

10 in. x 20 in. Type "A" Jaw Crusher
14 in. "Bulldog" Gyratory Crusher
No. 7½ Gyratory Crusher
36 in. x 16 in. Type "A" Crushing Roll

And the Same Economy That's Found in Traylor "Bulldog" Crushers is Built in Traylor Motor Trucks and All Purpose Tractors

STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY



Showing Mill at Work

AN "OPEN-DOOR" PULVERIZER FOR CEMENT-CLINKER, LIMESTONE, ETC.

Release the bolts, throw open the door and every wearing part is within easy reach. One man can open a 5-ton door in a few minutes.

A GREAT TIME AND LABOR SAVER

Unequaled in Capacity, Small Power Consumption, Cheap Upkeep, Accessibility and Simplicity

CEMENT CLINKER

To 20 mesh: 80 to 100 bbls. per hour
To 40 mesh: 60 to 80 bbls. per hour
To 60 mesh: 40 to 50 bbls. per hour
To 80 mesh: 30 to 40 bbls. per hour

LIMESTONE

To 20 mesh: 16 to 20 tons per hour
To 80 mesh: 8 to 14 tons per hour

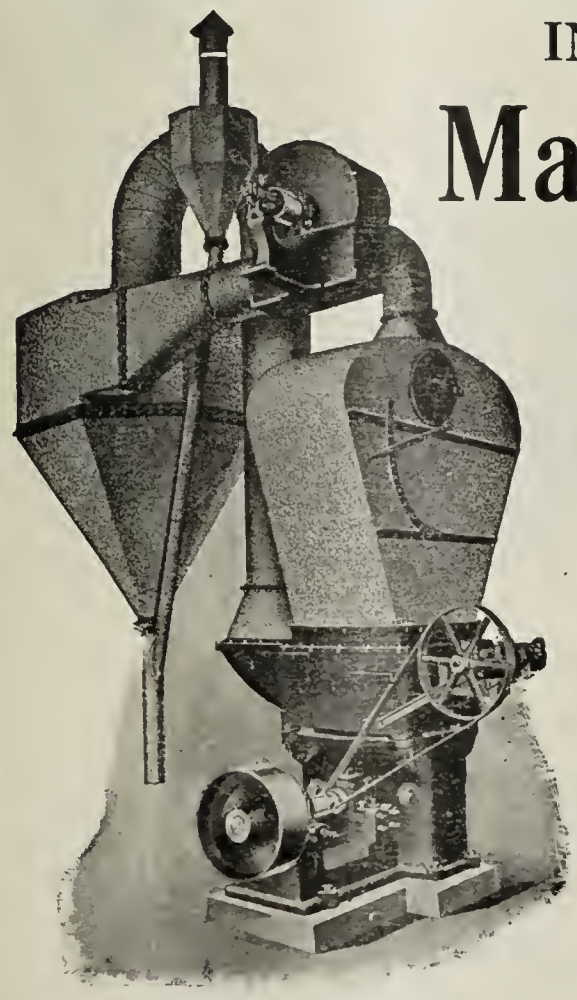
Built in 5 Sizes — Send for Circular

CRUSHERS—GRANULATORS—GRINDERS—PULVERIZERS—
SCREENS—MIXERS—ELEVATORS—CONVEYORS—CHUTES

STURTEVANT MILL CO., BOSTON MASS.

BOSTON, Harrison Sq. NEW YORK, Singer Bldg. CHICAGO, Peoples Gas Bldg. ATLANTA, Healey Bldg.

Complete Grinding IN ONE Machine



In successful use grinding Cement, Clinker, Limestone, Coal

INSTANT REGULATION OF FINENESS

NO DUST

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THE BONNOT CO.
CANTON, OHIO

THE CHOICE OF LIME OPERATORS

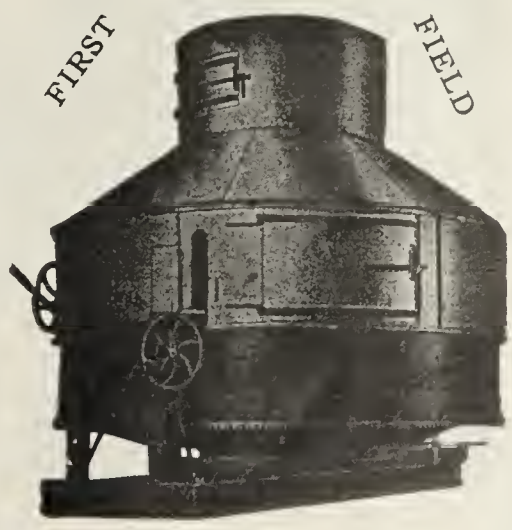
Like all Modern Hydrating Plants the Ladd Lime & Stone Co. is equipped with a Clyde Hydrator.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

Simple, easiest to operate and most economical in cost of installing, maintaining, and operating.

IN THE FIRST FIELD



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H. MISCAMPBELL
Patentee and Sole Manufacturer
DULUTH - - MINNESOTA

The Bradley Hercules Mill

Built for the Preliminary Pulverizing of Cement Materials

In Operation at the Largest and Most Successful Cement Plants Since 1913 —More Popular Than Ever and More Successful

13 Mills Sold to Pennsylvania Manufacturers
Other Installations in Tennessee—New York—North Carolina—Illinois—Oklahoma—California—Washington—Cuba—Argentine

It's the largest preliminary machine manufactured adapted for pulverizing Cement Rock, Limestone or Clinker.

One manufacturer with two mills ground 170,000 barrels Clinker in one month—another manufacturer has averaged 40 tons per hour, when grinding Limestone over a period of several years of operation.

It's a Wonderful Labor and Power Saver

Our Engineers will gladly show you how this mill will reduce your present operating costs, using your present tube mill equipment, and increase your output.

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Works: Allentown, Pa. **BOSTON, MASS.**

Manufacturers of Pulverizing Machinery for 30 Years

FASTER ROCK DRILLING

Your drilling speed in quarry or "open cut" contract work can be increased 25 to 100 per cent by adopting

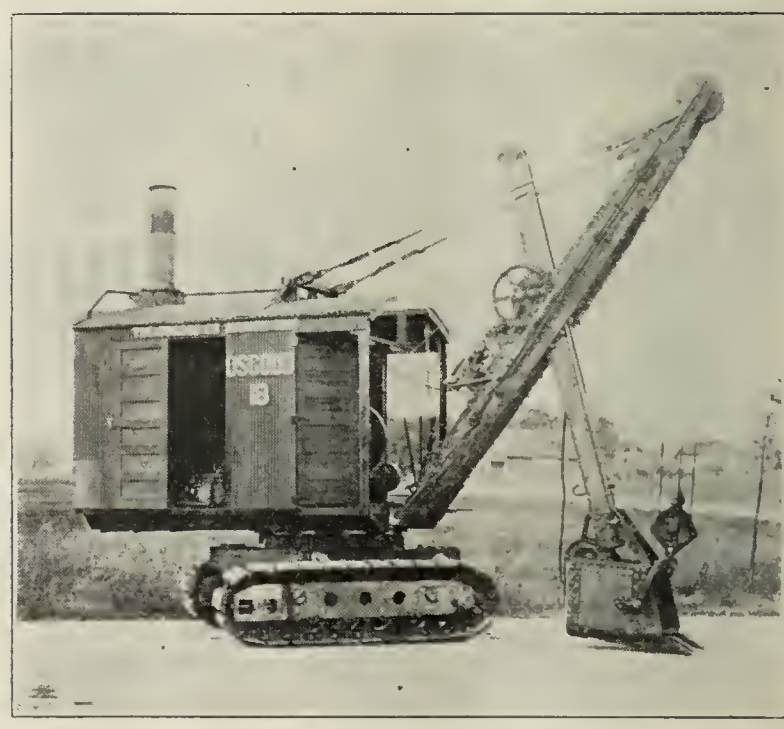
SULLIVAN Hollow Piston Rock Drills

These drills throw a jet of live air or steam through their hollow piston to the face of the bit, blowing out the mud or cuttings as fast as they are made, and thus eliminating the time lost with other drills in cleaning the hole.

If you are delayed by stuck drill steel, ask for Bulletin 1770D

Sullivan Machinery Co.

418 Gas Bldg. **CHICAGO**



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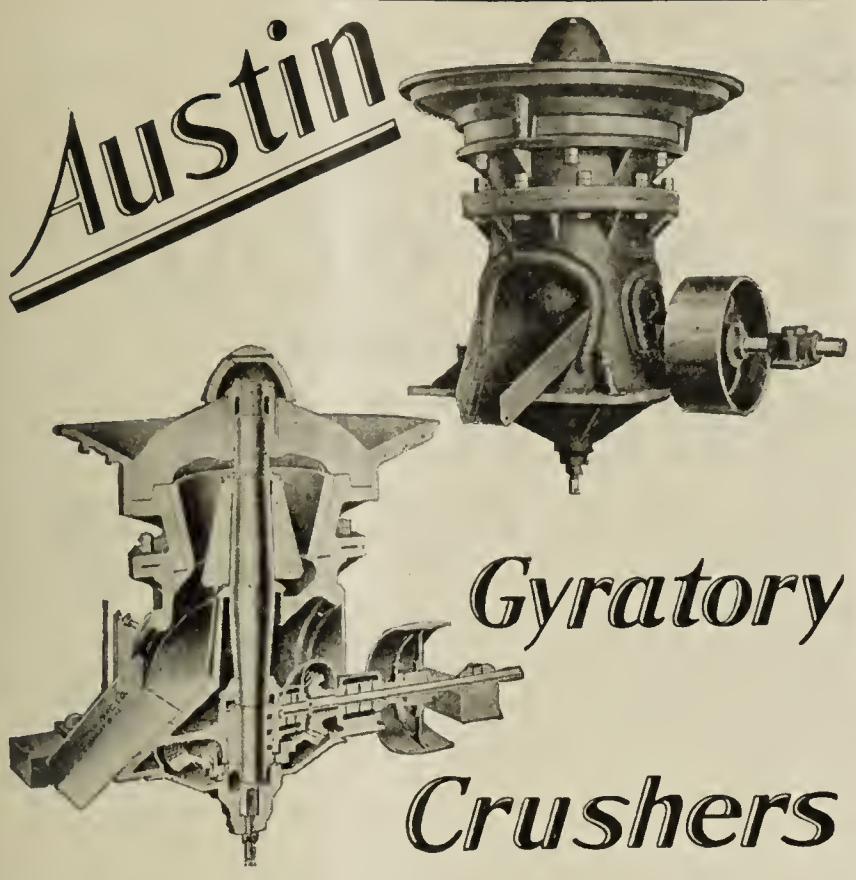
You cannot afford to wait longer to investigate many improvements added to make the New 1921 Model Osgood 18 with its liberal dimensions and sturdy construction.

THE SUPER STEAM SHOVEL

Write, phone or wire today. Full information furnished. No obligation to you.

THE OSGOOD CO., Marion, Ohio



Stationary and Portable

Efficient — Economical — Reliable

The Gyratory type of Crusher has numerous features of proven worth.

The Austin has SIX features not found in any other Gyratory Crusher.

Catalog No. 28-D illustrates and describes a full line of Crushers, Screens, Elevators, Quarry Cars, Hoists, etc., and should be in the hands of everyone interested in crushing plants.

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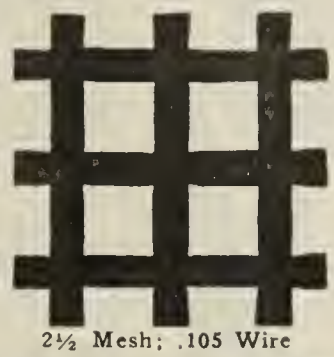
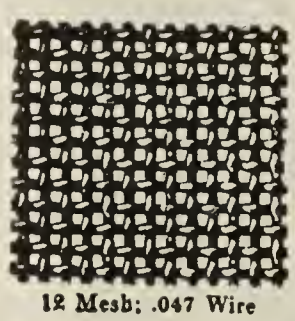
ALLIED ALLIED CONSTRUCTION MACHINERY CORPORATION 120 Broadway New York, U.S.A.

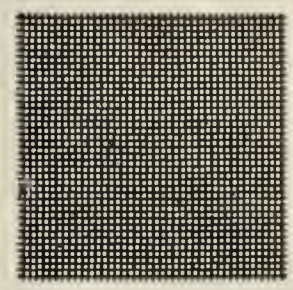
Cleveland Double Crimped WIRE CLOTH



2½ Mesh; .105 Wire



12 Mesh; .047 Wire



40 Mesh. .0135 Wire

You should use our screens because a uniform fineness of screened product is assured by an even, accurate mesh. This is a characteristic of "Cleveland" Double Crimped Wire Cloth.
Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

The Cleveland Wire Cloth & Mfg. Co.

3579 E. 78th Street, CLEVELAND, OHIO

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Gravel and Dredging Pumps

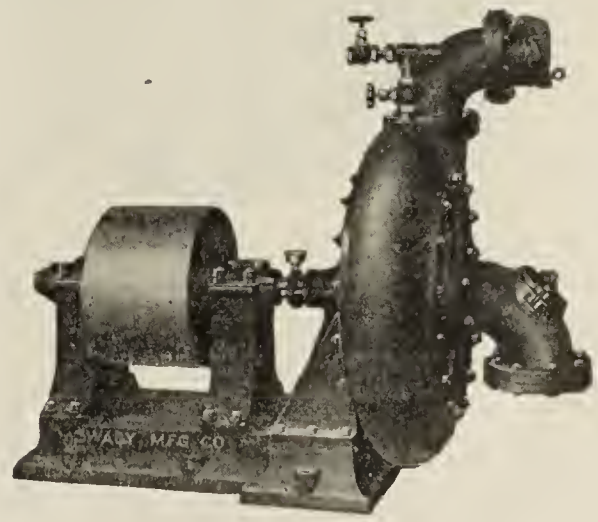

Illustration shows belted outfit but can also be supplied direct connected to Vertical Engine upon same base.

Swaby Manufacturing Co.

2010 MARSHALL BLVD.
CHICAGO, ILL.

"WE ARE GLAD"

TO RECOMMEND

GRUENDLER

AUTOMATIC PULVERIZER

"Because it has proven beyond doubt its Reliability, Speed Power and Dependability.

"These are the reasons why we gladly recommend the Gruendler crusher and pulverizer, which we have been operating in our plant for the past four years. Its repair costs are unusually low, it requires very little power and it turns out a clear uniform product with great rapidity. We are well pleased with our Gruendler pulverizer."

(Signed) W. D. GEARHART, Mgr. Illinois Limestone Co.,
Robinson, Ill.

EQUIP YOUR CRUSHED STONE PLANT WITH A

GRUENDLER

AUTOMATIC PULVERIZER

It will increase your output, lower your costs and deliver a more uniform material.

A powerful mill, built for long service and uses less horsepower, giving greater capacity due to our improved features, Ball-Bearings and Sledge Hammer Principal. Our price is right.

"35 years of square dealing our guarantee." Built in standard sizes, 3 tons to 3,000 tons daily.

Literature describing each model in detail ready for you. Send today.

GRUENDLER PATENT CRUSHER & PULVERIZER CO.

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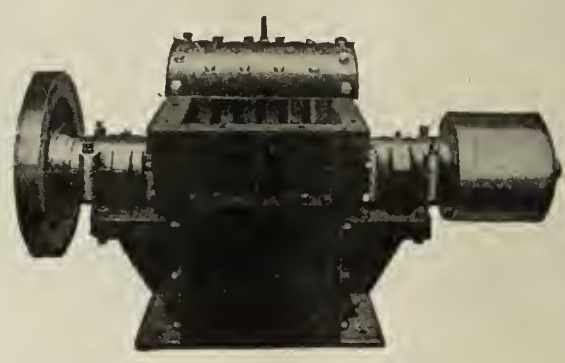
ST. LOUIS, MO.



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DEPENDABILITY

In its final analysis, Taylor Mesaba Steam Shovel Chain is dependable. While its tensile strength is high, that quality is only one of many, for it has the ability to absorb sudden and severe shocks and recover therefrom time after time; it makes innumerable bends over comparatively small drums and sheaves while under enormous stress; and, withal, it is able to withstand excessive frictional wear. All of these qualities correctly combined in Taylor Mesaba Steam Shovel Chain, plus correct manner and method of manufacture, produce its dependability and at the same time they make it durable, economical and safe.

Made only by

S. G. TAYLOR CHAIN CO.

144 SO. DEARBORN ST. CHICAGO

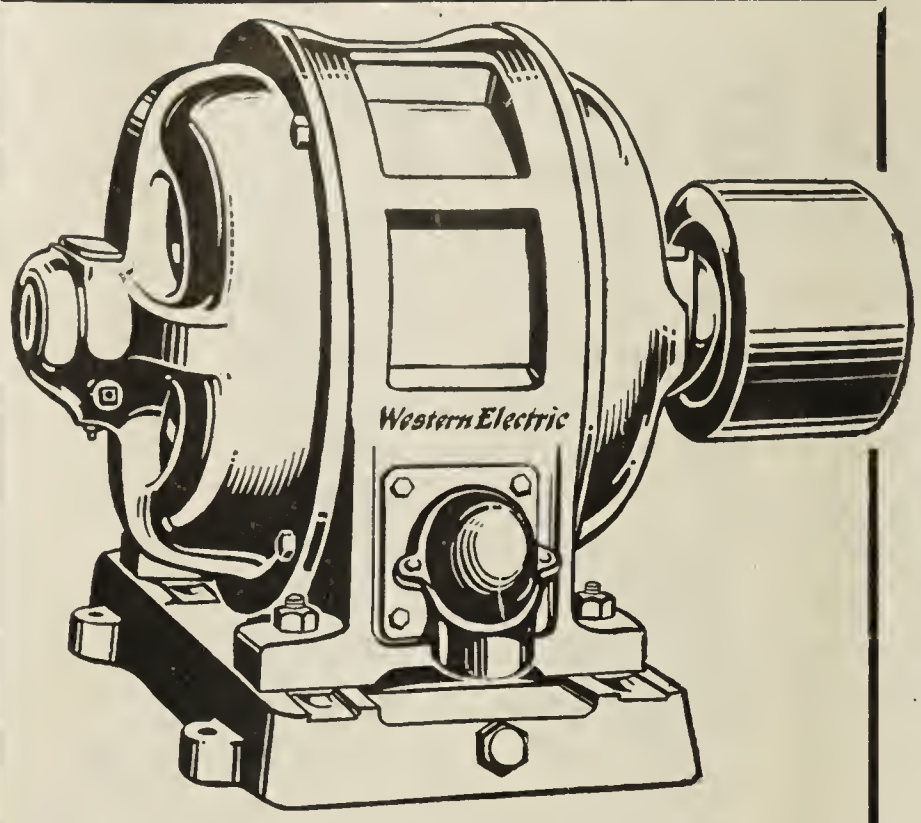
Ruggles-Coles Dryers

There are more than 180 Ruggles-Coles Dryers installed in plants manufacturing cement and its allied products. In many localities, they are the only possible choice of operators, because fuel is so expensive no other type of dryer could be used profitably.

Mechanical perfection, rugged construction and excellent design are among the important features possessed by Ruggles-Coles Dryers that have lead engineers and owners to recommend them so extensively.

Ruggles-Coles Engineering Company

120 Broadway New York City



DID YOU EVER STOP TO CONSIDER

That we have spent years of our time on your electrical problems? Years of untiring efforts which embraced university training, laboratory tests on material, plant analysis, etc? We offer you today the services of men from our organization who can carry your problems through to a successful issue, can meet your emergency just the same as we met others.

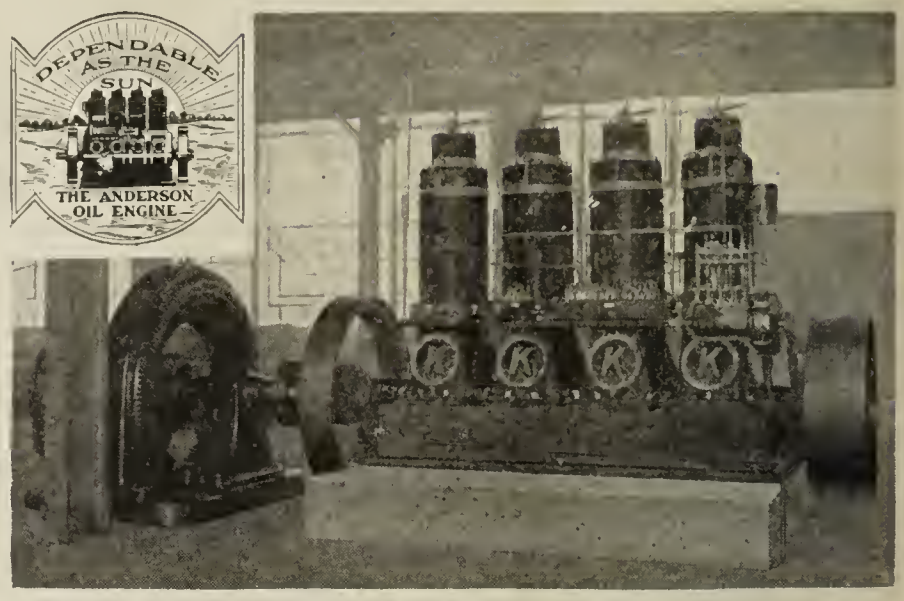
We are specialists in Motor Designing, Motor Building, Coil Building and Power Surveys. The knowledge we have gleaned after making a thorough study of cement mill plants and their operation, the experience we have gained through making the cement industry our choice of operations and our factory facilities we offer you now. We know we can be of aid to you and we also know you have your electrical problems to solve.

An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States.

Lansing Electric Engineering Co.

All the Name Implies

Lansing, Michigan



225 H.P. Type K Anderson Installation.

NEW ANDERSON TYPE K OIL ENGINES

Meet Every Power Requirement

Reliable | **15 to 225 H. P.** | **Efficient**

S imple to operate.
E ndures years of use.
R uns in either direction.
V ertical, proper construction.
I nterchangeable parts.
C an use small foundation.
E xacting speeds.

E asily accessible.
C an guarantee saving.
O perates on less fuel.
N o valves or trappy attachment.
O perates with less repairs.
M oney saved.
Y ear's guarantee.

Write for Catalogue and Information.

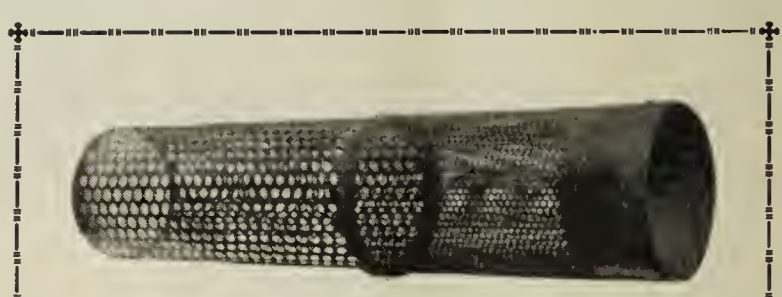
ANDERSON FOUNDRY & MACHINE COMPANY

A.F. & M. CO.

FOUNDED IN 1872 CAPITAL $1,400,000.00

ANDERSON, INDIANA, U.S.A.

PERFORATED SCREENS

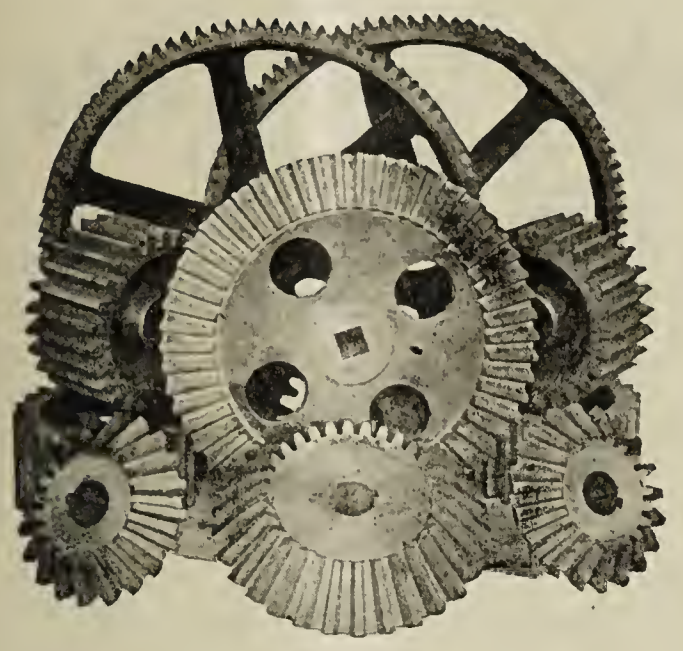


Made to suit your requirements. Advise diameter, length, thickness and size of perforations required.

NORTMANN DUFFKE CO.

1220 27TH AVE.

MILWAUKEE - - WIS.



BP— The name of a superior make of gears for the cement industry.

BP gears excel any other make of gears in the following characteristics:

—Hardness to resist wear and the destructive influences of abrasive dust.
—Strength to withstand shocks, strain and vibration.
—Smooth operation because of their accurately cut teeth.
—Long life.

BP gears are a product of the R. D. Nuttall Company and are manufactured in all types and sizes up to nine feet in diameter.

For reliability, long life and smooth operation specify Nuttall BP gears

R.D.NUTTALL COMPANY
PITTSBURGH AGMA PENNSYLVANIA

Nuttall

BATES
VALVE BAGS
INSURE SAFE DELIVERY

If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

THE VALVE BAG CO. OF AMERICA

TOLEDO, OHIO

Analyze Your Drilling and Blasting!

Our new Blast Hole Catalog B-46 (96 pages) will help you.

The day of poking a hole down with a rivet header or a converted hay bailer is past.

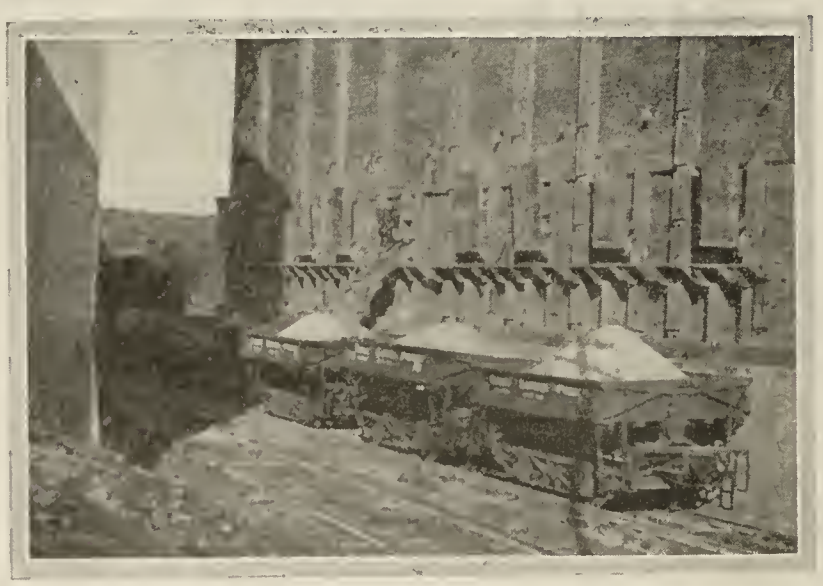
Drilling, being the first step in stone production, is the most important. One cent or one half cent per ton cost saved in this operation often eliminates competition.

With Cyclone No. 14 Drills on the job and Cyclone Service in reserve, your drilling and blasting troubles fade—and your costs will be right!

THE SANDERSON-CYCLONE DRILL CO.
ORRVILLE, OHIO.
Eastern and Export Office: 30 Church St., New York.

YOUR HAULAGE IS SOMETHING

WHICH WE SHOULD TALK OVER WITH YOU



The by-product (fine ground limestone) at the plant of the Thurber Earthen Products Co., Tiffin, Texas, is loaded at the bins into Western 6-yard cars and dumped in storage piles. The same cars handle stone to the crusher.

Our engineers may be able to help. A haulage system frequently limits production, slowing up shovel and crusher. The Western 6-yard dump car, shown herewith, seems to be the favorite with Cement, Crushed Stone, Gravel and Clay producers. It is the smallest Western standard gauge car and plenty large for most plants. It is easy to go to a larger size if necessary. If you are not ready to go to the standard gauge basis, the famous Western 4-yd. and 5-yd. will make your shovel hustle to keep up.

Let's get together and analyze your haulage problem. If we can increase your production and lower your unit-cost, it will be a good thing all around. Western Dump Cars usually pay for themselves.

Our Dump Car catalog explains why Westerns are superior to other cars.

Write today.

Western

SOLVES YOUR HAULAGE PROBLEMS

Western Wheeled Scraper Company
Earth and Stone Handling Equipment
Aurora, Illinois

VULCAN Rotary Kilns

CHARGING and discharging are an uninterrupted process with VULCAN Rotary Kilns. Wet or crumbly materials are easier handled because there are no grates to clog. Perhaps your industry is of the kind—

Where Continuous Feed is Essential or Desirable

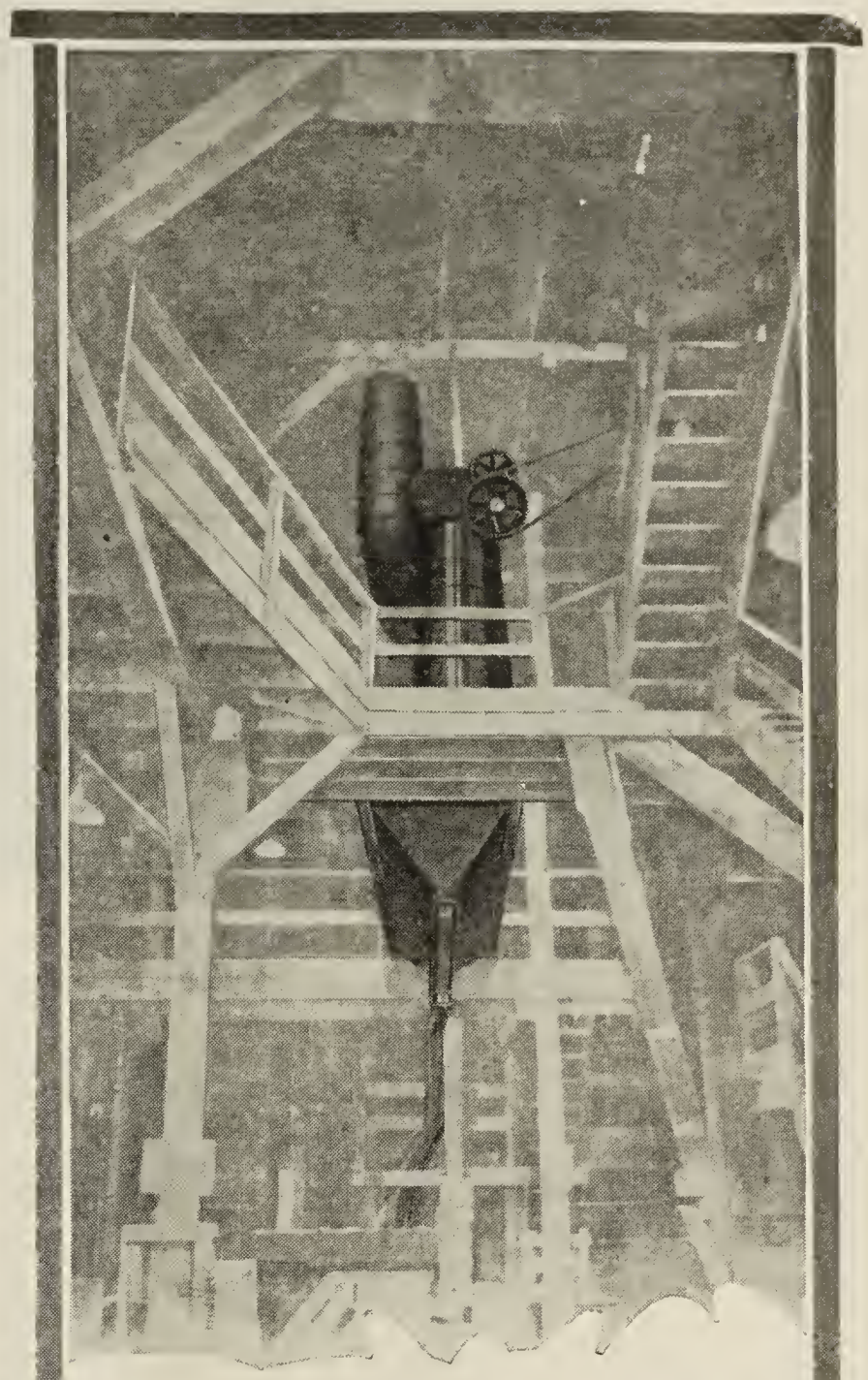
Wet or Dry Cement Manufacture
Nodulizing Ores and Cement
Bituminous and Anthracite Coal Driers
Ore Roasting
Nodulizing Blast Furnace Dust
Stone Driers for Limestone
Continuous Retorting in Chemical or Metallurgical Plants
Pulp Driers
Dehydrating
Oxidizing Processes
Sulphate Drying and many others

Write us for recommendations on design and construction

VULCAN IRON WORKS

Established 1849

1740 Main Street Wilkes-Barre, Pa.



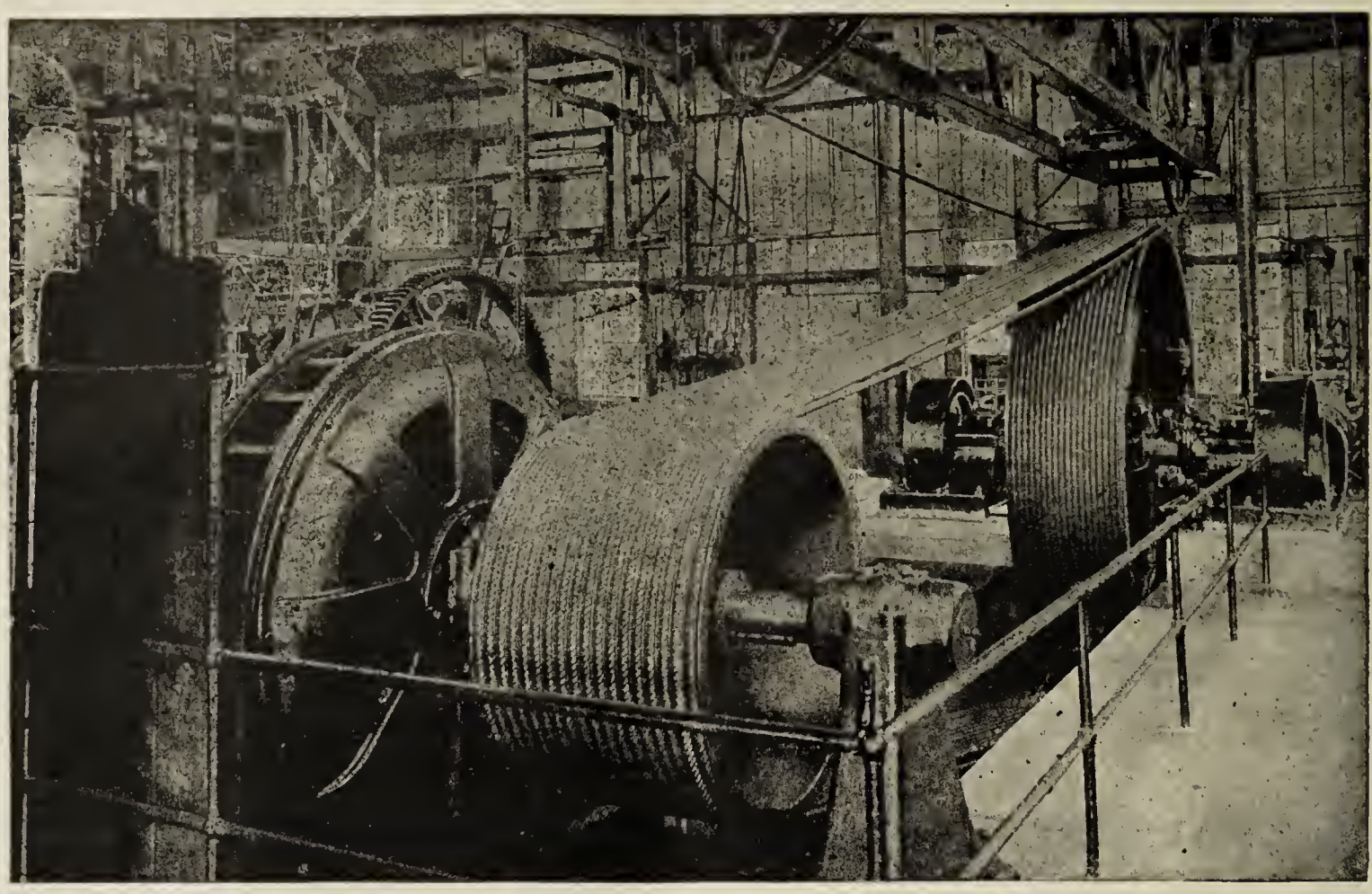
A Dust Collector Which Pays for Itself

By purifying the air which the men breathe in this plant, thus increasing their efficiency, and by salvaging the dust removed from the air, this Allis-Chalmers Dust Collector has paid for itself in a very short while. This device is installed in Hillsville, Pa., plant of the Carbon Lime Stone Company.

To collect the dust and keep itself in "collecting condition"—that is the problem solved by the A. C. Style B Dust Collector.

Ask for Bulletin 1454-O

ALLIS-CHALMERS
MILWAUKEE, WIS. U.S.A.



High-efficiency generation of electric power with rope drives

For large generator installations where the slightest inefficiency in the transmission of power from the driving force to the generater is costly, Dodge Rope Drives have advantages that other methods of power transmission cannot present.

Rope drive flexibility is unequaled. The same efficiency obtains whether the sheaves almost touch or are at a distance; whether they are in line or around a corner and at an angle.

Under overloads rope drive efficiency increases rather than decreases.

A thousand horsepower rope drive is quieter than a six-inch belt.

These things alone make a choice of generator drives unwise until the Dodge Rope Drive is thoroughly investigated.

DODGE

Dodge Sales & Engineering Company

Distributor of the products of the Dodge Manufacturing Company and the Dodge Steel Pully Corporation

General Offices: Mishawaka, Ind. Works: Mishawaka, Ind., and Oneida, N. Y.

Canadian Plant: Dodge Mfg. Co. of Canada, Ltd., Toronto and Montreal

Philadelphia Cincinnati New York Chicago St. Louis Atlanta Boston
Pittsburgh Minneapolis Houston Seattle Newark

Cement and Engineering News

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Ask Change in Freight Rates

Cement manufacturers again are at odds over freight rates on cement in western trunk line territory as a result of the petition to the Interstate Commerce Commission of the Iola Cement Mills Traffic Association and the Lincoln, Neb., Chamber of Commerce, to reopen Docket 8182, Western Cement Rates. The question is the inclusion of eastern Kansas, eastern Nebraska and southwest Missouri in Scale II teritory, in view of a "ruinous" situation confronting mills in Kansas and Dewey, Okla.

The petition of the Association states that the application of Scale III rates in this territory has brought about a shrinkage in prices to meet competition.

Profits, it is shown, have been reduced to a dangerous point on the business retained, while at the same time the total shipments of cement from Kansas and Dewey have fallen off from 33 to 35 per cent. This decline has been recorded in spite of a material increase, for instance, in total mill shipments for the whole state of Nebraska.

The Iola petition contends that prior to the readjustment of rates and the application of Scale III, there was no evidence of demand or purpose on the part of the carriers for increased rates on cement from the Iola district to the disputed territory The present rates from Kansas and Dewey to Nebraska points exceed the rates effective June 24, 1918, increased 2 cents under General Order 28, plus the 35 per cent increase authorized by the Commission last summer.

Cannot Hold Business

Conditions do not warrant a higher scale in this territory, according to the Iola petition, and the net mill prices at Dewey and Kansas are already lower than those of competing mills in Missouri and Iowa under Scale II. The Iola mills have not been able to hold the business they formerly controlled in Nebraska, and have been forced to withdraw from a market described as "the natural geographical trade territory of the Kansas and Dewey mills."

In proof of this contention, they offer shipping data to show that of the total shipments of all mills to Nebraska in 1918, the Kansas and Dewey mills had more than 53 per cent. In 1919, the percentage was 38, and in 1920, was 33 per cent.

The filing of the petition for a reopening of the Docket showed so much opposition to its success, that it is clear if the commission grants the Iola petition, it will have to make a readjustment of the cement rates throughout the Western Trunk line territory.

Thus, the Missouri Portland Cement Company says that the situation complained of in Kansas and Nebraska is as true with respect to movements from Kansas City and Sugar Creek, as from the Kansas gas belt. But it opposes reopening the docket on the ground that such an investigation involves a retrial of the whole matter and "it would be difficult to avoid extension of the limits of the territory."

The United Portland Cement Company wants Montana, Texas and New Mexico to be considered in getting the benefit of scale territory rates. The Nebraska Cement Company, the Colorado Portland Cement Company, and the United States Portland Cement Company at Denver, are opposed to a reopening of the docket.

Illinois Producers' Demands

The Illinois producers which filed the brief are: Alpha Portland Cement Company, Lehigh Portland Cement Company, Marquette Cement Manufacturing Company and the Sandusky Portland Cement Company.

The Lehigh wants the western boundary of Scale II territory extended to include Superior, Neb. The Atlas Company asks reopening of the investigation for the purpose of determining the basis of rates from Hannibal, Mo., and other points of production in western trunk line territory other than Mason City and Duluth. It asks further investigation for the purpose also of considering the advisability of abolshing key point rates and having mileage scales applied from all points; to make an additional scale territory in western trunk line territory; and to fix a basis of rates for the intrastate shipment of cement in western territory.

Indiana Concrete Road Specifications

The Indiana State Highway Department has changed somewhat its specifications for concrete roads this year. The old specifications require 1.91 barrels of cement per cubic yard, while the new ones require only 1.7 barrels. The chief engineer of the department, C. Gray, is quoted as saying that the mixture under the old specifications was so rich as to cause an unnecessary amount of cracking and that the decision to decrease the amount followed a conference with James T. Voshell, district engineer for the Federal Bureau of Public Roads. He said that more or less cracking has appeared in the 45 miles of concrete road completed under the old specifications.

Qualities of Sand-Lime Brick

Sand-lime brick, according to Circular 109 of the U. S. Bureau of Standards, is a building brick made of sand and lime. It was first produced in the United States in 1901. By the action of steam under pressure the lime is caused to combine with some of the sand, forming a hydrated calcium silicate. This material acts as a bonding agent to hold the rest of the sand together. Most sand-lime bricks will compare favor-

ably with "first common" clay bricks. They are characterized by their straight edges, parallel faces, and nearly white color. Their continued use in northern climates has established their durability under weather conditions, but sand-lime brick is not a refractory material. The industry maintains a national association with which the Bureau co-operates in conducting research work on the subject. Bureau of Standards Technologic Paper 85 contains detailed descriptions of the method of manufacture and of several factories. A good sand-lime brick for general purposes should have an absorption of not over 20 per cent, an average compressive strength of not less than 2,000 lb. per square inch, and an average modulus of rupture of not less than 450 lb. per square inch.

Stucco Appropriate for Bank Building Exteriors

By George B. Wills, President the Wills Egelhof Co. Inc., Builders, New York City.

[*Editorial Note:—In the article below, Mr. Wills has very clearly drawn attention to a field for stucco construction which has been very little developed heretofore. We are all too prone to keep to the well-beaten paths so that stucco has been considered almost exclusively a material for houses. Stucco for bank buildings, especially in the smaller towns and cities, offers good opportunities for builders.*]

A great deal has been written concerning stucco construction for residences, farm buildings and similar structures. Many people have considered that while stucco is well suited for such buildings, it was not appropriate for really high-class buildings.

The bank-building is preeminently the highest-class building because of the fact that banks are owned by moneyed interests who want the best and are willing to pay for it. Futhermore, they know it is desirable to have a bank building which will by its very solidity, dignity and elegance convey an impression in keeping with the integrity of their institution.

These requirements usually mean a type of building which is necessarily expensive, especially in these days of very high cost for all classes of construction. During the past few years there has been a great and increasing demand for bank edifices which possess all the dignity and strength desired, and yet at the same time do not entail a heavy drain on the banks' resources for first, cost, as well as for perpetual overhead charges for interest on investment.

To meet this condition of high cost, we have recently built two banks with stucco exteriors, and produced very good looking and lasting building without excessive cost.

The new home of the Peekskill National Bank, at Peekskill, N. Y., was orginally an old store building with a second floor of offices, and an uglier building could not be designed. The remodelled building we believe will meet the approval of every banker and even every architect, as possessing that character of appearance desirable in a bank edifice. In fact, when looking at the remodelled building it is difficult to believe that the old shell of the biulding still exists under the new stucco.

In doing the remodeling, we filled up the old window openings of the second story, cut the necessary new openings, placed the new parapet wall, and raked out the joints of the brick work to form a good bond for the stucco. The stucco was composed of one part of white cement and three parts of common yellow sand, except the column capitals and a few ornaments which were cast in plaster to match the color of the stucco.

Speed of construction also was an important consideration in the remodeling. The bank was doing business in its new quarters in three months.

To have built this building of stone or similar material would have delayed the time of occupation of the building many months, to say nothing of at least doubling the cost. As far as those dealing with the bank are concerned, not one out of ten would notice the difference between stucco and cut stone.

Another excellent example of the use of stucco for bank buildings is shown in the Bath County National Bank at Hot Springs, Va. This building is of hollow tile covered with stucco composed of one part white cement and three parts of comon yellof sand. We believe yellow sand give better results for this purpose than does white sand, because the color of the stucco is very similar to limestone.

Lump Lime

Many masons prefer lump lime to any other material for their work. The older men in particular are well acquainted with this material and obtain excellent results from its use. Some of the younger men, however are not so familiar with the proper methods of handling lump lime, and sometimes they have unfortunate experiences.

Lump lime deserves the same close attention that is given to other materials, in order to obtain the best results A little time spent in experimenting with the brand of lime most used will be amply repaid by increased efficiency. In contrast with some other mortar and plastering materials, lump lime is obtained in concentrated form, which permits sand and water to be purchased locally at a minimum of handling costs.

Reasons for Experimenting.

There are several reasons for testing out the lime to be used, especially if it is a different brand from that to which the men on the job are accustomed. In the first place, the mortar man should know approximately how the material will slake, whether it is quick or slow-slaking, or whether it has any special action that requires a certain method of control. It is also well to know how much paste a barrel of lime will produce, and also how much the sand-carrying capacity of the paste may be increased by ageing it.

Quantity Tables Valuable

The mason contractor will do well to prepare a table for his own reference, which will give him at a glance the number of cubic feet of paste which can be obtained per barrel or ton of lump lime, and the amount of sand that a cubic foot of paste will carry at the age of two days, seven days, and fourteen days. Study should be devoted to the area covered by the sanded plaster for different types of plastering. It is well also to indicate how much lump lime is required to lay a thousand of brick or other block.

Such a table will aid materially in estimating, especially when the bid must be close. It will also help in ordering supplies and keeping the job running smoothly.

Brick masons do efficient work when supplied with well-mixed lime mortar, which is the reason most of the successful and progressive contractors and builders throughout the country are using the Kent mortar mixer, manufactured by the Kent Machine Co., Kent, O., which is simple and economical, for thoroughly and quickly mixing their mortar.

The New Petoskey Cement Mill

One of the most modern cement producing plants in the world is in operation at Petoskey, Mich. It is known as the Petoskey Portland Cement company and is situated on the shores of the Little Traverse bay. The plant covers a part of the site, comprising 377 acres in which, above lake level, there are more than 100,000,000 tons of stone available for cement. This will furnish raw material sufficient to keep the plant in operation for generations to come, according to the company's officials.

During the war the plans for the construction and outfitting the plant were retarded, but through the untiring efforts of John L. A. Galster, A. B. Klise and Homer Sly the project was completed.

The buildings of the Petoskey Portland Cement Company are of steel and concrete construction.

The method of manufacture is what is known as the "wet" process. The one item of utilization of waste gases alone employed to make steam, will save the company approximately $100,000 annually in coal cost. This is just one example of the economy and efficiency in vogue in this great industry which compels the admiration of experts.

The Waste Heat System was designed by the Edge Moor Iron Company and installed under their direction. It includes a special damper control and flue construction that they have developed, the high type of four pass Edge Moor boiler and specially constructed and arranged superheaters, economizers and fans that they have developed for this purpose. The Edge Moor Iron Company make complete installations and guarantee results. The Petoskey Portland Cement Co. with present manufacturing facilities is prepared to produce 2,500 barrels of cement daily and when required, additional units will multiply this production.

The complete equipment for this modern cement mill such as gyratory crushers, compeb mills, motors, kilns, etc., was furnished by the Allis-Chalmers Mfg. Co., Milwaukee, Wis. The kilns are lined with dependable fire brick furnished by the Davis Fire Brick Co., Oak Hill, Ohio.

One big storehouse is designed to hold over 100,000 barrels of finished product.

The soil covering of the stone is so slight as to offer no obstruction in the ready removal of rock when the pieces frequently as large as an office safe, are, with electric cranes removed with ease and by crushers reduced to any desired size.

Seventy-five thousand tons of the crushed rock for iron industry flux purposes, and road building work will be shipped during the current year to lake ports, in addition to the 100,000 tons shipped annually to the Newaygo Portland Cement Company. This, together with the large output of cement, means vast shipping tonnage.

Standard gauge railroads, locomotives and cars fully equipped, which belong to the company, facilitate the movement of materials from one point to another within the cement plant area.

Over a quarter of a million barrels of cement have already been sold in Wisconsin and 100,000 barrels to Michigan distributors. Other lake ports will be added to the sales list.

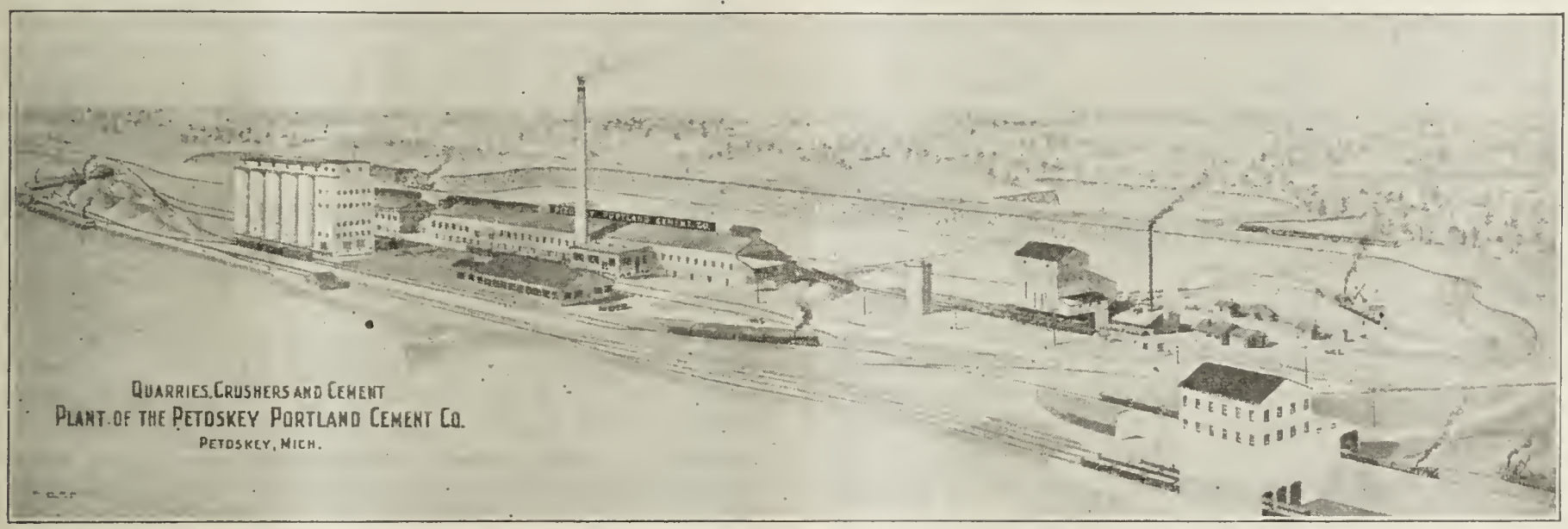
The J. C. Buckbee Co., Chicago, designed and built the new cement mill.

A new lake carrying corporation, the Petoskey Transportation Company, is now being formed for the express purpose of transporting the products of the cement factory.

The Michigan securities commission has approved this undertaking which, when ready for operation, will find its cargo capacity ready and continuous.

Three steamships will be purchased for lake transport, the first to be in operation by July 10, and these, delivering rock and cement will return to the great concrete docks of the cement plant laden with coal.

Petoskey in these two distinct but completely co-operative corporations, fully appreciates their commercial value to the community and the bearing it will have on population and financial increase.



Hydrated Lime in Concrete

National Lime Association, Mather building, Washington, D. C., has issued a booklet on the use of hydrated lime in concrete. This is the Association's pamphlet No. 353 and will be sent without charge to anyone making application for same. It is a concise treatise on the subject and contains many practical pointers for the worker in concrete. It is claimed that the use of hydrated lime in concrete improves the workability of the mixture so that it can be placed in forms more easily. Also that it reduces the quantity of water required, produces watertight concrete and improves the surface finish.

Water Important in Concrete Surface Conditions

It is astonishing that there appears to be among engineers generally so little realization of the importance of producing concrete construction "of permanently good appearance," consequently so general a failure to grasp the cause of unsightly concrete.

Efflorescence or bloom, "characteristic patches and streaks of discoloration," surface cracking and checking, spalling and the many other surface ills which are responsible for the "distressing appearance" of so much concrete construction have a single underlying cause. The presence of water in the concrete either through the natural absorption of rain and atmospheric moisture into the surface, or, and more serious and important, the percolation of water through the concrete to the exposed face.

The action of moisture is, in the main, three-fold: first, the dissolving of the soluble magnesium and calcium salts in the concrete and carrying them to and depositing them on the surface as efflorescence or bloom; second, by creating differential expansion—the expansion of concrete due to varying moisture content being considerably greater than that due to temperature changes—it starts cracks parallel to the surface at approximately the average depth of penetration of the moisture with resulting spalling; third, by sudden expansion on freezing it creates additional cracks and completes the work of deterioration already started.

On concrete building construction and most vertical concrete surfaces above grade it is a question simply of preventing the surface penetration of water. It must be admitted here that as far as the writer knows none of the methods at present generally in use are entirely satisfactory but it is felt that by the use of the right type of paint or colorless penetrative waterproofing application with particular attention given to the back of parapets and copings, quite efficient results can be obtained. The writer has observed instances where such handling of the problem has produced most satisfactory results for periods of from ten to twelve years.

On retaining walls and particularly on concrete bridge construction the problem is chiefly one of percolation of water through the concrete and is more serious and difficult. Its successful solution at the initial attempt is more vital. Here it is strictly a pressure waterproofing problem; to be solved, however, as the particular conditions demand. The point of real importance is that the need of real waterproofing efficiency and the need of producing this efficiency at the first try be generally recognized. In the writer's experience he has observed two essential characteristics beside waterproofness which a waterproofing system for this work should possess—a proved, effective life equal to that of the structure; elasticity under all conditions and variations in temperature.

In conclusion the writer seriously doubts if in concrete construction "there is any prospect of being able to make exposed surfaces of permanently good appearance without finishing treatment" or at least effective protection against water percolation. He believes, however, that "concrete construction that can honestly show its own face" will be produced when it is generally recognized that water is its worst enemy and must be thoroughly and efficiently guarded against.

ALLRICH S. HARRISON,
New York.

Blasting Rock in Built-Up Sections

By James Veness, Connecticut

I find that many contractors hesitate to use dynamite for blasting cellars in rock if other buildings are nearby. It is my opinion, based on long experience, that damage to buildings, and especially windows, is almost always caused by loading bore holes too heavily or by trying to break up too great an area of rock in a single blast.

Of course, the temptation is strong to put down a number of holes, connect up the charges in series, and fire simultaneously to get the cumulative effect resulting from that method of loading. Of course, that is the economical way, the time saving way, the way that should be adopted when the excavation is a safe distance away from other structures, but otherwise single-hole shots and small charges should be the rule.

At the Kent School, New Milford, Connecticut, the cellar was to be 36 ft. x 26 ft. and 7 ft. deep. Rock extended two feet above the ground; that is, nine feet of rock excavation. A three-story glass-front building stood within thirty feet.

Several contractors refused the job because of the risks. By employing the following simple method, I got away with it without doing a cent's worth of damage!

Bore holes were 18 inches deep and loaded with 1½ lbs. of forty per cent ammonia dynamite. Charges were covered with four or five railroad ties chained together and fired a single hole at a time.

Only seventy pounds of dynamite were used on the job, which was completed by three men in three weeks.

Test of Concrete Oil Tanks

Permeability tests on small concrete tanks containing mineral and vegetable oil have been under way at the Bureau of Standards for over two years and were noted in the "Proceedings" of the American Concrete Institute for 1919. Since then some additional information has been gained which is summarized in a paper by George A. Smith, of the Bureau, as follows:

Mineral oils covering practically the entire range of fuel oil, have been stored in concrete tanks for nearly three years and have shown no injurious effects upon the concrete.

Cocoanut oil, lard oil, neatsfoot oil and boiled and raw linseed oil have been found to be more or less injurious to concrete.

On the basis of this last series of tests, 1:1½:3 concrete, mixed to a consistency suitable for reinforced-concrete construction and properly placed should be satisfactory for containers of fuel oils whose viscosities are above 0.06 in absolute units, or about 50 Saybolt seconds, at 20 deg. C.

While many of the tests have shown penetration for the lighter oils which are not in excess of permissible losses, the use of concrete tanks for kerosene and gasolene storage would hardly seem warranted under ordinary conditions.

A limited number of tests indicates that the use of hydrated lime or the application of sodium silicate solution is not effective in reducing the permeability of concrete to the lighter oils.

Effect of Crusher Screenings in Concrete

Increase in Strength of Concrete Through Use of Up to 20% of Crusher Screenings in Aggregate—Economic Advantage of Utilizing Screenings

Important tests recently carried out by the Milton Hersey Company, Ltd., Montreal, for the Crushed Stone Corporation, Ltd., Dundas, Ont., show a decided advantage in using crusher screenings up to 20 per cent of the clean stone. A summary of the report made for the Hersey Company by Walter C. Adams, engineer of tests, and James G. Ross, consulting mining engineer, follows:

The materials used in the investigations, upon which the comparative results are based, were ordinary Portland cement and the following:

Crushed stone from the lower beds of the Dundas quarry, being that part of the product of the crushers which passed through a 1¼-inch diameter screen and was held on a ½-inch diameter screen, known commercially as 1-inch crushed stone.

Table 1.—Compressive Strength of Concrete Cylinder Four Inches in Diameter and Eight Inches High Made With the Lower Quarry Rock Stone and Screenings.

Material used:	Cement	Sand	Rock	Screenings	
Size: Maximum, ...		8-mesh	1¼ in.	⅜ in.	
Minimum, ...		down	½ in.	down	
Proportions of mixture	1 part volume	2.25 parts volume	4.0 parts volume	0% to 20% of the 4 parts of crushed stone	
Screenings to rock: By weight,	Mixture with no screenings	Mixture with 5% screenings	Mixture with 10% screenings	Mixture with 15% screenings	Mixture with 20% screenings
Compressive strengths:	Pounds Pressure Per Square Inch				
Age at breaking, 7 days	1,461	1,639	1,641	1,551	1,597
Age at breaking, 28 days	2,223	2,729	1,423	2,582	2,259

Note:—The breaking strengths indicated are in each case the average of five test cylinders broken.

Crusher screenings for the concrete tests were from the lower beds and for the mortar tests from both the upper and lower beds of the Dundas quarry, being all of that part of the product of the crushers which passed through a ⅜-inch diameter screen.

Crusher grit taken from the crusher screenings noted above, being that part of these crusher screenings which was held on a 10-mesh sieve when separated in the laboratory from the finer material or crusher sand.

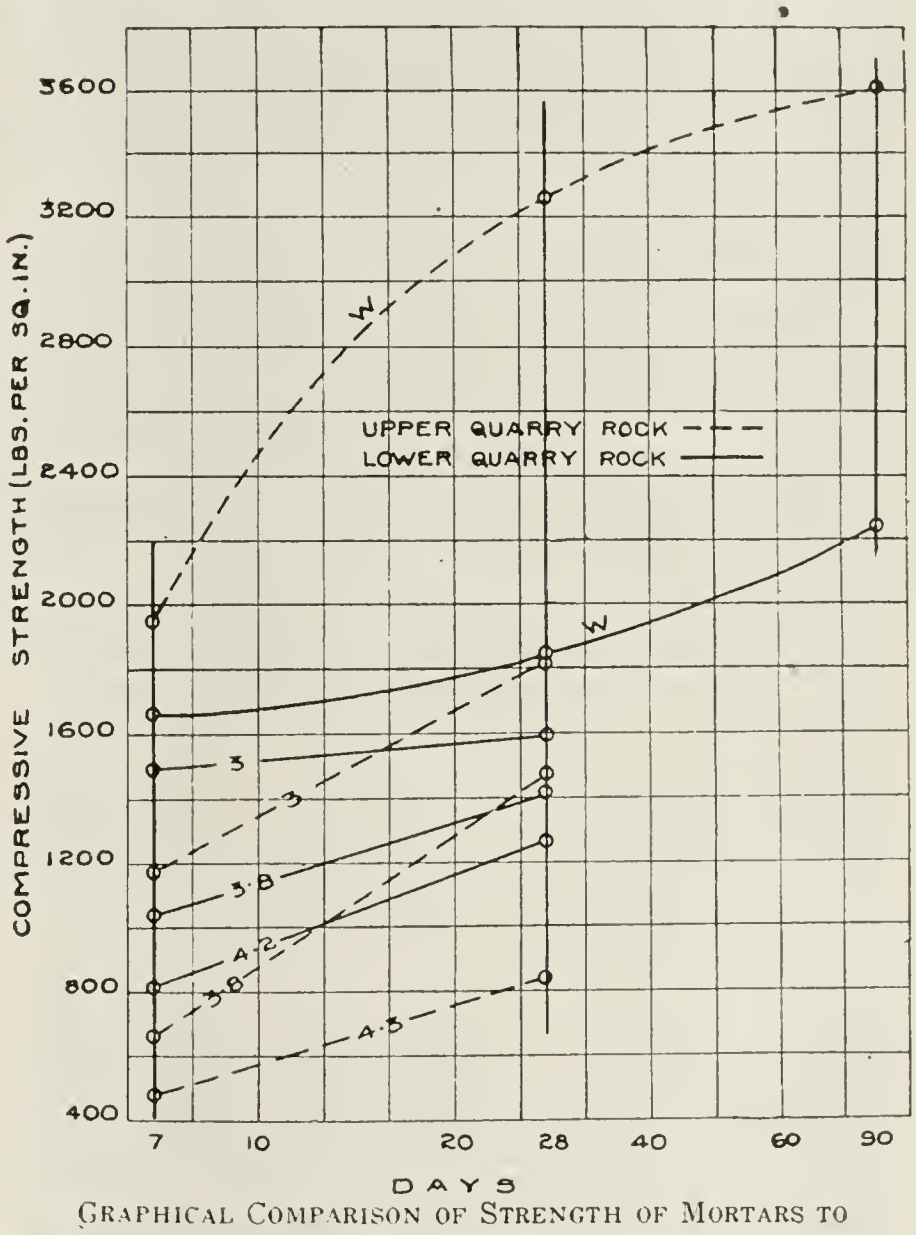
Crusher sand taken from the crusher screenings noted above, being that part of these crusher screenings which passed a 10-mesh sieve when separated in the laboratory from the coarser material or crusher grit.

River sand, dredged from the bottom of the Lake of Two Mountains, which is a part of the Ottawa River, a good grade of ordinary coarse sand such as is usually considered satisfactory for concrete work. Eighty-five per cent of it will pass a 14-mesh sieve and be held on a 48-mesh sieve; but it contains no pebbles, and practically none of it would be held on a 10-mesh sieve. It is extensively used in concrete mixtures, and has been frequently tested by us and found satisfactory for the aggregate finer than the 10-mesh.

For the purpose of determining if the presence of small quantities of crusher screenings in the crushed stone from the Dundas quarry,—such quantities as might incidentally be present in the crushed stone as delivered commercially for use,—would be detrimental to the concrete mixtures produced therefrom, we made a series of sets of concrete cylinders from five different mixtures, and then determined the compressive strengths of these cylinders.

The Portland cement, the sand, and the clean crushed stone proportions of these mixtures were the same in all cases. One mixture was made without the addition of any crushed screenings. To the other four mixtures were added crushed screenings to the extent of 5, 10, 15 and 20 per cent, respectively, of the weight of the clean crushed stone proportion. Up to the highest per cent used by us, these crusher screenings would be lost in the voids of the crushed stone proportion, increasing its weight without materially increasing the loose volume measurement; so these tests very closely approximated conditions found in field practice.

The results shown in Table 1 show that the presence of crusher screenings in the crushed stone, up to the point when, if separated out, these crushed screenings would be 20 per cent of the clean crushed stone, is not only not detrimental to the concrete mixtures produced therefrom, but that there is an actual increase in the strength of the resulting concrete.



GRAPHICAL COMPARISON OF STRENGTH OF MORTARS TO LOGARITHMIC SCALE

W. Crusher screenings.
Numbers on curves show volumes of aggregate to cement.

The most surprising finding is that the addition of a small quantity of the crusher screenings should make so marked an increase in the strength of the concrete as is indicated when 5 per cent of the weight of the crushed stone proportion is added in screenings,—which is less than 3 per cent of the total mixture,—and the strength increased from 2,223 to 2,729 pounds per square inch, which is a gain of 506 pounds per square inch, or 22 per cent in strength. The opinion quite generally held by those who have not specially looked up the subject is opposite to this, though information has been available in text books on concrete

for many years. As these results have been obtained with crusher screenings from the lower quarry rock, which show less strength than the screenings from the upper quarry rock, they appear safe as a basis for estimate.

That these results are not unusual is shown by the following excerpt from Taylor and Thompson's "Concrete, Plain and Reinforced," page 166 of the 1919 edition, where they state that: "Fine aggregates of limestone composition, either sand or screenings, usually produce a mortar of higher strength than common sand. Tests, by the authors, of natural limestone sands from Canada and northern New York, show in certain cases as much as 50 per cent to 100 per cent greater strength than would be expected of ordinary sand of similar mechanical analysis. The gain in strength is somewhat slower than with quartz sand. The higher strength of mortar of limestone aggegates probably is due to their chemical composition. Results similar to these have been reached abroad by P. Alexandre and R. Feret."

Table 2.—Compressive Strength of Mortar Cylinders Two Inches in Diameter and Four Inches High Made With the Upper Rock Screenings

Material used:	Crusher screenings	Crusher grit and course sand		
Mixture proportions:	A-1	A-2	A-3	A-4
Portland cement, by volume	None	1.8 parts	2.3 parts	2.9 parts
Coarse sand, by volume	None	2. parts	2.7 parts	3.1 parts
Crusher screenings, by volume	3. parts	None	None	None
Crusher grit, by volume	None	1.6 parts	2.1 parts	2.4 parts
Ratio, cement to aggregate	1 to 3	1 to 3	1 to 3.85	1 to 4.3
Sieve analysis:	Per cent	Per cent	Per cent	Per cent
Passing ⅜ in. and held on 10-mesh	45	57	57	57
Passing 10-mesh and down	55	43	43	43
Total	100	100	100	100
Compressive strengths:	Pounds	Pressure	Per Square	Inch
Age at breaking, 7 days	1,940	1,161	667	480
Age at breaking, 28 days	3,249	1,818	1,472	835
Age at breaking, 91 days	3,586	2,380*	2,150*	1,140*

Note:—The breaking strengths indicated are in each case the average of four test cylinders broken; except the results marked (*), which were estimated from the accompanying graph.

For the purpose of determining whether the crusher sand from the Dundas quarry crusher screenings would be a satisfactory substitute for the ordinary bank or river sand usually employed and considered satisfactory for concrete work, we made two series of sets of mortar cylinders from a number of different mixtures, one set using the screenings from the upper layers of rock at your quarry and the other set using the screenings from the lower layers of rock,—there being a difference between the rock of the upper and lower layers,—and then determined the compressive strengths of these cylinders. In other words, a comparison was made between mortar mixtures of crusher grit and crusher sand,—the unseparated crusher screenings,—and mortar mixtures of crusher grit and river sand.

Table 3.—Compressive Strength of Mortar Cylinders Two Inches in Diameter and Four Inches High Made With the Lower Rock Screenings

Material used:	Crusher screenings	Crusher grit and coarse sand		
Mixture proportions:	B-1	B-2	B-3	B-4
Portland cement, by volume	1. part	1. part	1. part	1. part
Coarse sand, by volume	None	1.2 parts	2.3 parts	2.9 parts
Crusher screenings, by volume	3. parts	None	None	None
Crusher grit, by volume	None	1.6 parts	2.1 parts	2.6 parts
Ratio, cement to aggregate	1 to 3	1 to 3	1. to 3.75	1 to 4.25
Sieve analysis:	Per cent	Per cent	Per cent	Per cent
Passing ⅜ in. and held on 10-mesh	43	47	47	47
Passing 10-mesh and down	57	53	53	53
Total	100	100	100	100
Compressive strengths:	Pounds	Pressure	Per Square	Inch
Age at breaking, 7 days	1,650	1,484	1,037	808
Age at breaking, 28 days	1,823	1,590	1,406	1,260
Age at breaking, 91 days	2,241	1,680*	1,740*	1,640

Note:—The breaking strengths indicated are in each case the average of four test cylinders broken; except the results marked (*), which were estimated from the accompanying graph.

Table 4.

Calculation of savings based on data from Taylor and Thompson's "Concrete Costs"	Per cubic foot	1:2:4 mixture with river sand cu. ft.	cost	1:2½:5 mixture with screenings cu. ft.	cost
Portland cement, 1 bbl. as 4 cu. ft.	$0.75	4	$3.00	4	$3.00
Coarse sand	.045	8	.36	0	...
Crusher screenings, ⅜ in. down	.073	0	...	10	.73
Crushed stone 1½ in. to ½ in. size	.09	16	1.44	20	1.80
Production and cost per batch	...	17.1	4.80	27.3	5.53
Material per cu. yd. of concrete, strength equal	...	..	7.58	..	5.47
Difference or saving in cost of materials per cu. yd. of concrete	...	..	...	..	2.11
Percentage or saving in cost of materials per cu. yd. of concrete	...	..	...	..	28%

Note:—Assuming the present price of concrete at about $10 per cu. yd., which is conservative, it is thus seen that a saving of about $2 per cu. yd., or say from 15% to 25%, to his client on the price of the completed concrete is probably a careful preliminary study by the engineer of the materials available and the most advantageous proportions for obtaining the desired strength.

Two mortar mixtures of the same proportioning were made, one using the crusher screenings from the upper rock and the other from the lower rock, of Portland cement and crusher screenings,—the unseparated crusher grit and crusher sand;—none of the river sand being employed. These mixtures are reported in the first columns of Tables 2 and 3.

Table 5.

Calculation of savings based on data from Taylor and Thompson's "Concrete Costs"	Per cubic foot	1:2:4 mixture with river sand cu. ft.	cost	1:2:4 mixture with screenings cu. ft.	cost
Portland cement, 1 bbl. as 4 cu. ft.	$0.75	4	$3.00	4	$3.00
Coarse sand	.045	8	.36	0	...
Crusher screenings, ⅜ in. down	.073	0	...	8	.58
Crushed stone 1¼ in. to ½ in. size	.09	16	1.44	16	1.44
Production and cost per batch	...	17.1	5.80	22.3	5.02
Material per cu. yd. of concrete, strength equal	...	..	7.58	..	6.04
Difference or saving in cost of materials per cu. yd. of concrete	...	..	...	..	1.54
Percentage or saving in cost of materials per cu. yd. of concrete	...	..	...	..	20%

Note:—Crusher screenings would have to cost $5.48 per ton f. o. b. job—whereas they only cost about $1.35 on the job—to give an equal cost per cubic yard of concrete against a cost for ordinary poor graded sand of $1 per ton besides the mixture containing the crusher screenings producing stronger concrete and thereby giving greater satisfaction to the engineer or architect.

Two series of mortar mixtures of the same proportions were made, one using the crusher grit from the upper rock crusher screenings and the other using the crusher grit from the lower rock screenings, and in both using the river sand, with Portland cement; none of the crusher sand being employed. These series of mixtures are reported in the columns to the right of the first columns of Tables 2 and 3.

The results tabulated show that, in both series of tests, the mortars made using the crusher sand in place of the river sand are considerably stronger in all cases, the increase in strength varying all the way from a minimum increase of 15 per cent in a one-to-three mixture using the material from the lower quarry rock to a maximum increase of 79 per cent in a one-to-three mixture when the material from the upper quarry rock was used.

To the engineer or architect who has decided that a concrete of a certain strength is required, the results of the foregoing tests are of interest in that they suggest a means of securing the desired result and at the same time of materially reducing the amount of cement per cubic yard of finished concrete, with a consequent decrease in cost with equal or increased strength. For instance, if a 1:2:4 concrete mixture of the ordinary poorly graded sand and crushed stone with a high per cent of voids gives a satisfactory concrete, we may expect an equally satisfactory concrete, using screenings, which are usually well graded, in

place of sand, and a well graded crushed stone, with say a 1:2½:5 mixture, or possibly one even lower. Referring to page 153 of Taylor and Thompson's "Concrete Costs," we obtain an estimate of the concrete to be produced from these two mixtures, and may make a comparison of costs, as stated in Table 4, assuming the following prices for materials:

Material Cost—	At origin	F.O.B. Job	Cu. ft.	Weight
Portland cement...	...	$3.00 bbl.	$0.75	87 lbs.
Sand	$0.30	1.00 ton	.045	90 lbs.
Screenings	.65	1.35 ton	.0.73	108 lbs
Crushed stone	1.30	2.00 ton	.090	90 lbs.

To the contractor who has signed an agreement to make a concrete of certain arbitrary proportions, without reference to the strength of the concrete which such proportioning will produce, there is not the same degree of incentive to investigate the possibilities of using crusher screenings that exists for the engineer or architect who represents the owner. However, most contractors take a certain pride in their work, and will at least prefer to do a good job rather than a mediocre one if it will not cost them any more; and, if, besides doing a better job, they can also save a little money, so much the better for them, in which connection reference should be made to the tabulation of costs in Table 5.

It is obviously impossible to make any correct general statements concerning the use of limestone crusher screenings in all cases, without very extensive investigations with comparative materials from many different sources but the tests and data stated in the foregoing report are so convincing that the following comments are justified:

1. That the presence of crusher screenings in crushed stone up to 20 per cent is far more likely to substantially increase the strength of the resulting concrete rather than to decrease it.

2. That the substitution of crusher sand for ordinary river or bank sand such as is usually considered satisfactory for concrete work is far more likely to increase the strength of the resulting concrete rather than to decrease it.

3. That, for engineers and architects, there is the possibility of much gain to their clients by the use of crusher screenings in concrete instead of, or in combination with, ordinary sands, as the crusher screenings will usually improve the grading of the aggregate and reduce the voids and consequently lessen the cost by increasing, for a given strength, the volume of concrete that may be produced per barrel of cement.

4. That, for contractors, there is the possibility of added financial profit,—with better concrete more satisfactory to the engineer or architect,—to be gained by the use of crusher screenings in concrete instead of, or in combination with, ordinary sands, as the crusher screenings will usually improve the grading of the aggregate and reduce the voids and consequently produce a greater volume of concrete to the barrel of cement with a given formula of proportions, and at the same time increase the strength of the resulting concrete.

Accelerators for Cement

By EDWARD D. BOYER, Cement Expert.

There have recently sprung up as a sort of side line to waterproofing compounds for cement, a number of mysteriously named products advertised as accelerators for cement. We Americans are always in a hurry. We builders delight in finishing a building in record time. And, Presto, along comes the salesman with just the thing to add to your concrete to make it so hard that you can remove the forms in 24 hours, and just as an added inducement he tells you it will make your concrete harder and stronger.

Let us consider what accelerating of cement means.

The most desirable acceleration is that which does not affect the setting of the cement, because if this were hastened it would not allow concrete to be placed properly before it began to harden. Therefore, to be most valuable, acceleration must hasten the hardening and the gain of early strengths in the concrete.

Hastening the hardening process is useful in some cases of floor and sidewalk construction, since it allows the surface to be finished much earlier and hence saves overtime and night work of the cement finishers. It is for this particular use that the majority of accelerators are now being used.

Calcium Chloride an Accelerator.

There are a number of substances which will hasten the hardening of cement, of which calcium chloride is the best known and most used. Calcium chloride is a white granular substance soluble in water. It is dissolved in the mixing water and has two actions—it hastens the hardening of the concrete and also lowers the freezing point of the water a few degrees.

The U. S. Government Bureau of Standards conducted a series of tests in 1916 to determine the effect of calcium chloride. These tests showed that the best percentage of calcium chloride to be used is 3 to 4 per cent of the weight of the mixing water. This amount gave increases in strength at 48 hours of from 14 to 275 per cent for the 1:2:4 mix and from 11 to 110 per cent for the 1:1½:3 mix.

In a resume of tests on calcium chloride issued March, 1919, the Bureau of Standards gives in the table on Page 14? compresion strengths of concrete.

It will be noted from this table that the gain in strength of 10% solution over a 4% solution does not warrant the use of the stronger solution. Note also that at ages of six months and one year there is very little gain in strength from the use of calcium chloride; the principal advantage being the increased strength in the early stages.

Compression Strength of 1:2:4 Concrete
In pounds per square inch.

Per cent Calcium Chloride added to Mixing Water.	Age of Concrete when tested				
	2 Days	3 Days	28 Days	6 Months	1 Year
None	636	784	2240	3489	3783
4%	996	1263	2412	3523	3849
10%	1137	1365	2400	3634	3888

In making the 4 per cent solution, 4 pounds of calcium chloride crystals were dissolved in 12 gallons (100 lbs.) of water. Since commercial calcium chloride is about 75% strength, this means that a 3% solution of actual calcium chloride results from the mixing of 4 lbs. to 12 gallons of water. Assuming 50 gallons of water to a cubic yard of concrete, we find that there is required slightly over 16 pounds of calcium chloride per cubic yard of concrete. The price per pound is from 2c to 5c (depending on locality and quantity purchased) so that the cost for the acceleration is from 32c to 80c per cubic yard of concrete.

Where Accelerator Should Not Be Used.

The principal drawback to the use of accelerators is that the chlorine contained tends to promote corrosion of reinforcing steel. This is a very serious defect and best practice dictates that no material containing calcium chloride should be used in concrete or mortar in which steel is embedded.

As an evidence of this corroding action, the results of tests of the Bureau of Standards already mentioned, appear to be conclusive:

"Results of the corrosion tests of the plaques show that at the end of one year in both the 1:2 and 1:3 mortars gaged with 4 per cent calcium chloride, both with the galvanized and the plain expanded metal lath, the metal had been attacked, varying in amount from a few rust spots on the galvanized lath to complete rusting through in some cases of the plain lath. Lath embedded in 1:3 mortars not gaged with the calcium chloride examined at the same time showed that the metal absolutely clean with no indications of corrosion."

"In the cases of the rods embedded in 1:2 and 1:3 mortars and concretes of mixes of 1:1½:3 and 1:2:4 proportions gaged with 6 per cent of calcium chloride, all the metal had been attacked showing rust pits, while the rods in the mortars and concretes mixed with plain water were not corroded at all."

Conclusions

1. Calcium chloride increases the early strength of concrete by hastening its hardening.
2. A 4 per cent solution (4 lbs. to 12 gallons water) appears to give best results.
3. It lowers the freezing point of mixing water slightly, but should not be depended upon to take the place of heating materials and protecting concrete during freezing weather.
4. Should not be used in concrete containing reinforcing steel or metal lath, because it promotes corrosion.

Concrete Is Good Material for Piping

A general increase in the use of concrete for irrigation pipe lines has made it necessary to study concrete pipes from an engineering standpoint: This has been done by the irrigation engineers of the Bureau of Public Roads, United States Department of Agriculture, and the results are presented in Department Bulletin 852, "The Flow of Water in Concrete Pipes." The engineers say that poor construction has often brought concrete pipe, when used for carrying irrigation water, into disfavor, but where properly made the pipe is undoubtedly a success.

For a long time concrete was thought to be adaptable to low head pressures only, but, with the better methods of construction now in use in this country, concrete pipe is often used for 100-foot heads. In Europe concrete piping is successfully subjected to much heavier uses and lines have been built to withstand pressure heads of several hundred feet. Steel reinforcement is usually given the pipe when the heads exceed 15 or 20 feet.

Concrete has the advantage of being capable of construction on the spot where the pipe is to be laid. This feature makes it extremely valuable for irrigation projects and pipe lines that are far removed from railways and where transportation is difficult. Its cost compared with the cost of cast iron and steel, its permanence and comparatively fireproof qualities, are in its favor. Reinforced concrete pipe is usually more expensive than wood-stave pipe and has not the required elasticity of wood or metal when subjected to the wide range of temperature. Proper expansion joints, however, will care for these temperature changes, it has been found. Tests made by irrigation engineers of the department show that, while average concrete pipe has not the carrying capacity of average wood-stave pipe, a concrete pipe of the highest grade will convey slightly more water than the same size of wood-stave pipe.

It is difficult to obtain any figures on the period of usefulness of the concrete pipe. It is apparent, however, from studies made of pipe laid down 38 years ago that there is no material decrease in the carrying capacity. A concrete pipe in France, after fifteen years of service, showed a deposit only one-sixteenth inch thick on the interior surface. The bulletin contains abstracts of experiments made by agencies other than the Irrigation Division, and is illustrated by photographs showing various forms of cement pipe construction. It treats primarily of the subject of flowing water in concrete pipes and is based on field tests made on pipes in commercial operation. The bulletin is intended for the use of engineers designing and measuring concrete pipes for irrigation, power, mining, municipal or other purposes, and for courts and lawyers interested in cases involving questions as to the carrying capacities of concrete pipe.

Coarse Sand in Road Construction

In Indiana, aggregate producers were having difficulty in getting material to meet the specifications of the state highway commission of that state for gravel aggregate for concrete roads. The specifications called for coarse aggregate from ¼ inch up, permitting a tolerance of only 5 per cent material passing the ¼-inch screen. The Indiana gravel banks have an excess of coarse sand. To relieve this situation a long series of tests was undertaken by Purdue University under the direction of Professor W. K. Hatt, and while the results of the tests are not as yet completely known, it is indicated that in concrete of the richness used in roads, comparatively high percentage of this coarse sand may be used without decreasing the strength of the concrete. As a consequence the new specifications may allow a tolerance of 15 per cent of material passing the ¼-inch screen in the coarse aggregate.

A Correction

The article in our April issue on pages 22 and 23 entitled "Concrete Institute Holds Active Meeting" was taken from the February 24, 1921 issue of "Engineering News—Record" and as we failed at that time to acknowledge the source of this article we now give due credit to Engineering News—Record.

Book on "Modern Road Building and Maintenance"

The Hercules Powder Co., Wilmington, Del., have issued a book entitled "Modern Road Building and Maintenance," which is just off the press.

This book has been prepared for the use of engineers, contractors, road officials, students and all who are interested in the rational and economic solution of the many problems connected with our public roads and traffic they are required to carry. The book was written by Andrew P. Anderson, Highway Engineer of the Bureau of Public Roads. It contains chapters on—Planning the Road; Road Materials; Road Construction; Road Maintenance and Repair and Use of Explosives.

A copy will be sent free to anyone making a written request to the Hercules Powder Company, Wilmington, Del.

New Hydrated Lime Plant in Georgia

Most Modern and Improved System of Hydrating and Bagging—Plant Driven Throughout by Electric Motors

The accompanying photographs show the new hydrated lime plant of the Ladd Lime and Stone Co., Cartersville, Ga. The plant is located at Ladds' on the Rockmart division of the Seaboard Air Line Ry., about three miles from Cartersville and about fifty miles from Atlanta. Part of the plant has been in operation since September 1, 1920, when four of the kilns were fired and one unit of the hydrating plant was put in operation a few days later.

The first step in the development of the property was the construction of a modern stone crushing plant which has for some years been a large producer of crushed stone for concrete, road-metal, furnace-flux, and chemicals, and of ground limestone for fertilizer. The hydrated lime plant came next. Originally it was to consist of four kilns and one hydrating unit with provision made for doubling the capacity when needed. After constructive work was started and the first unit about half completed, however, it was decided to double the capacity of the plant at once by the addition of another unit.

The lime plant proper consists of 8 vertical kilns with all modern improvements. The hydrating plant consists of two hydrating units with a combined capacity of approximately 120 tons of hydrate per day. The first unit of the plan was completed late in August and the second unit in February.

Lime plant in foreground. Ground limestone and quarry in background

View of Clyde hydrator

The limestone lies in the large hill which is seen rising to a considerable height above the low lands on which both the crushing plant and the hydrated lime plant are built. The upper strata of the deposit consists of a very hard silicious limestone admirably suited to road material and crushed stone. The lower beds, however, consist of a very pure high dolomitic limestone which burns to a clean white lime. This is declared to be one of the few, if not the only deposit of any size, of dolomitic limestone in the far South. The following analysis will give an idea of the purity of the stone:

Silica	0.90%
Iron Oxide and Alumine	0.82
Carbonate of Lime	55.76
Carbonate of Magnesia	42.64

The new hydrate is sold under the brand name "LADCO." It has been supplied in quantity to builders and masons in Atlanta and other cities of the South since the plant was placed in operation and has been thoroughly tested out by some of the best plasterers in these cities.

The lime is burned in vertical steel kilns of the latest design and is not handled by manual labor from the time the stone is dumped into the kilns until the bags of hydrate are rolled into the cars. The plant is driven throughout by electric motors, each machine having its own individual motor. The buildings are of steel with concrete floors and the construction is heavy and fireproof throughout. The roofs are of

galvanized iron and the siding is of expanded metal plastered with cement-stucco. In connection with the plant there is a large steel storage shed, so that the plant will always have on hand a supply of hydrate with which to fill orders.

The plant was designed and built by Richard K. Meade & Co., chemical and industrial engineers, of Baltimore, long acively identified with the development of the resources of the South. Joah Etchells was their resident engineer during the time of construction. The local officers of the Ladd Lime & Stone Co., are L. J. Backus, General Manager; E. A. Harding, superintendent. The sales are in charge of E. L. Osborne.

H. W. Caldwell & Son Co. Joins Link-Belt Co.

The Link-Belt Company has acquired all of the capital stock of the H. W. Caldwell & Son Company, and Mr. Frank C. Caldwell has been elected a director of the Link-Belt Company.

Two experienced and successful companies in the conveyor world have thus joined forces, with the result that the Link-Belt Company has added two new lines, Helicoid Conveyors and power transmission machinery, to its line of manufactures.

While the H. W. Caldwell & Son Company's plant will continue to operate under separate corporate existence and under its present name, the joint facilities of the two companies, and the broader avenues of distribution of the Link-Belt Company, ought to prove of distinct advantage to the customers of both.

There will be no modifications of the policies of the Caldwell plant, no impairment of its service to its customers, no change in the diversity or character of its product.

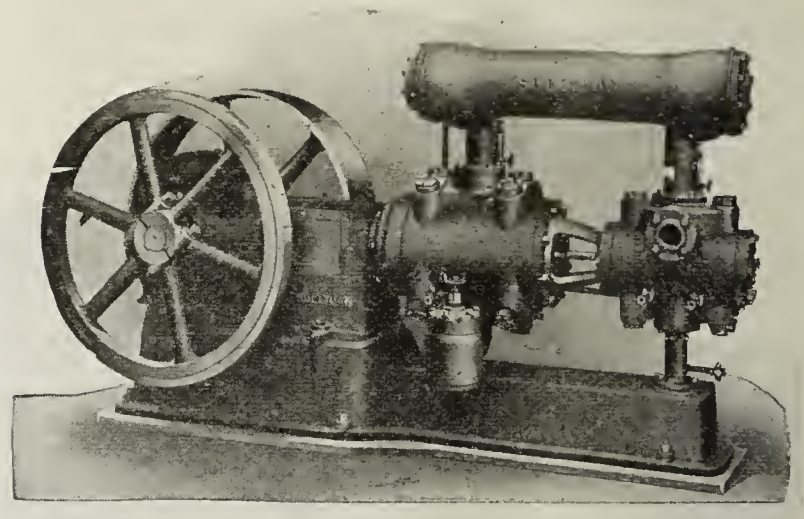
The plant management will remain substantially the same, and the new owners like the old will proceed on the theory that the good will of its customers is the company's best asset.

Sullivan Air Compressors

The Sullivan angle-compound power driven air compressors manufactured by the Sullivan Machinery Co., 418 Peoples Gas Bldg., Chicago, are illustrated in bulletin 77-B, that deals with three machines of the belted class and two of the direct connected class. These machines, introduced a dozen years ago, are now in extensive use in mines, quarries, shops, water works and on general construction, where it is claimed they deliver more actual compressed air than any other type of air compressor, per unit of power, attention, supplies, installation cost and floor space.

The distinctive features of the angle type compound compressors are that one cylinder with its connecting rod and cross head is almost horizontal, while the other is a high pressure cylinder with its accompanying members is in a vertical plane, and that both are actuated by a single crank. The advantages secured by these features include the balancing of reciprocating forces, small floor space, low cost of installation, low power cost per unit of air compressed, low maintenance cost, flexibility of drive, reduction in care and attention and accessibility. These claims are demonstrated by analysis and illustrated by engravings, made from various pictures of installations and by careful descriptions of the important details of the machine. The construction features include an open hearth steel crank shaft, a band fly wheel made in halves, high and low pressure cylinders with liners placed under hydraulic pressure, air actuated, plate type inlet and discharge valves, a three-pass counter current intercooler with copper or aluminum tubes, stream lubrications for shaft bearings and cross heads and guides, separate oil pumps for the air cylinders. The Class WN-3 compressors are adapted for operation by an electric motor, oil engine or water wheel mounted directly on the crank shaft.

Where more than 1,400 cubic feet of air per minute is required or where the capacity should be variable and elastic within wide limits the Sullivan twin angle compound compressors are recommended. These consist of two single complete compressors set side by side on a common foundation and driven by a common shaft on which is mounted either an electric motor or the belt pulley. These halves of the machine can be installed successively as required or my be detached and operated independently, or one half may be temporarily thrown out of service by closing one of the inlet loaders by hand. If only one quarter of the full capacity is sufficient, one side of the unit is uncoupled and one intake valve removed from the opposite side. For three quarter loads, both sides of the plant would be in commission, but on one side a set of inlet valves would be removed, one from the upper end of the high pressure cylinder and one from the rear end of the intake cylinder. One unit can be cut out leaving the other operating at full load, or one side can be run at full load while the regulation is applied to the other side to meet the demands.



Three hundred feet of free air economically compressed. For contract, quarry or shop air power service, this 300-foot Sullivan "WH-6" compressor form a popular size and type

The WI-3 single stage angle compressors compress the air in both cylinders alike from a common inlet conduit or separate inlets as required, the inter-cooler is omitted, and they are available in single units up to 2,700 cubic feet and for pressures for from 5 to 40 pounds. Air receivers can be provided with capacity of 12 to 376 cubic feet suitable for low pressure cylinder displacements up to 4,000 cubic feet per minute.

Dodge Oil Engines

The heavy oil engine division of the Dodge Sales & Engineering Company of Mishawaka, Indiana, announces the publication of a small catalogue describing Dodge Heavy Oil Stationary Engines, Dodge Heavy Oil Marine Engines, and Dodge Heavy Oil Engine Electric Generating units.

The catalogue is printed on paper of excellent quality and contains fifteen illustrations of the various types of engines described and is now ready for general distribution.

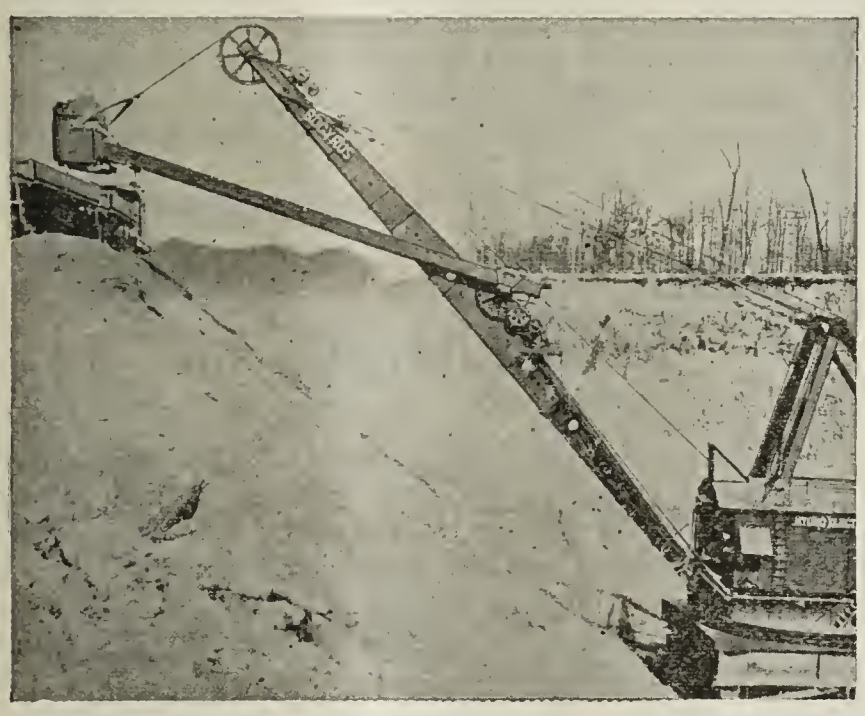
Operating Data on Large Shovels at Queenston Development

By L. C. McLURE

Records made in excavating the Queenston-Chippawa power canal by the Hydro-Electric Power Commission of Ontario have fully shown the value of large electric shovels. Over 20,000 cu. yds. of earth and rock were removed daily in digging this canal, the major portion of this being accomplished by means of three 8-cu. yd. electric shovels.

Not only have the volume records indicated the success of these shovels—which, by the way, are the largest in the world—but the operating economies have also proved conclusively the value of this equipment.

The operating economies were found by making a thorough test on shovel No. 1 while being used as



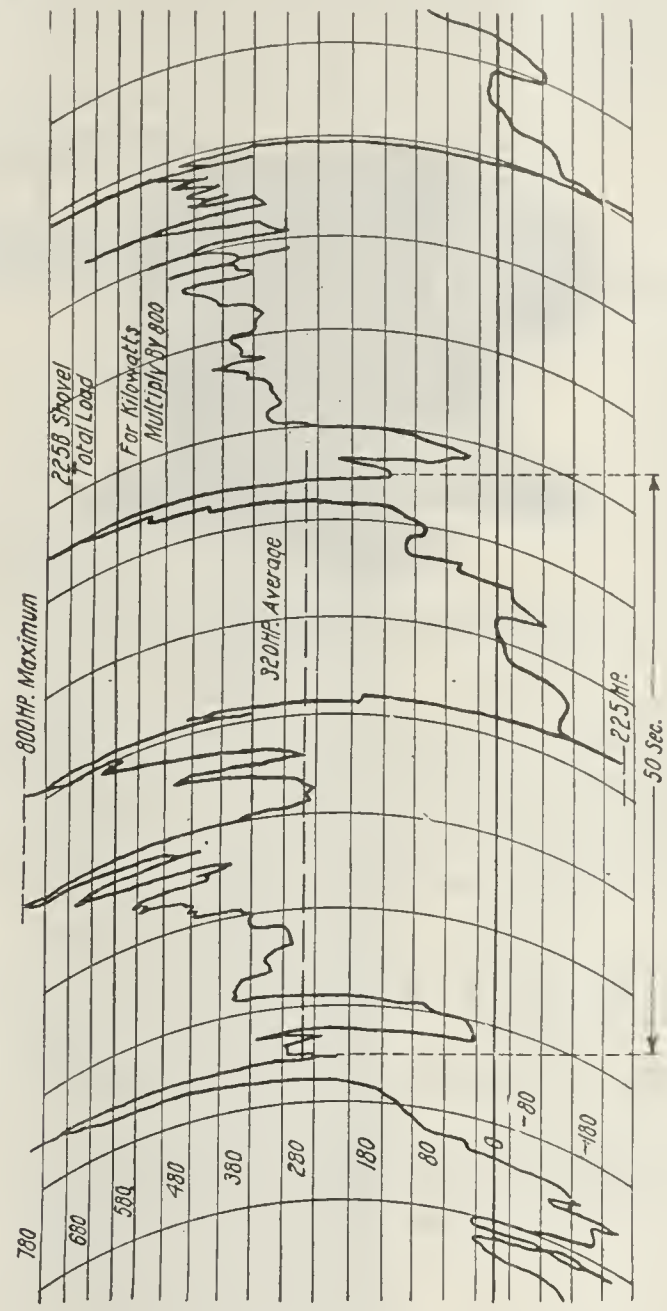
Shovel working against 90-foot cliff during power-consumption test

shown in Fig. 1. This shovel is of 300 tons weight, has a 90-ft. boom, uses either 5, 6, or 8-cu. yd. bucket, and works on a 40 to 50-second cycle of operation. There are four Westinghouse 440-vol. 3-phase, 25-cycle motors in this shovel, used as follows: Two 250-h.p. motors for hoist; one 150-h.p. motor for thrust; and one 150-h.p. motor for swing. The controllers are of the master-switch, magnetic type, and the whole operation is handled by two men. This shovel was working 90 ft. below the surface and loading material on cars approximately 70 ft. above its own base when the photograph reproduced in Fig. 1 was taken.

Results of Test on World's Largest Electric Shovel, Queenston-Chippawa Power Development

Total yards, whole test	24,706.5
" " day work only	15,380.0
" " day and night	9,326.5
Kilowatt-hours, whole test	20,346.0
" " day work only	12,216.0
" " day and night	8,220.0
K.w.h. per yard, whole test	0.826
" " day work only	0.794
" " day and night	0.882

Tests were made with a graphic wattmeter connected in the 4,000-volt circuit near the shovel. A high-speed clock in the meter allowed the chart paper to pass the pen at the rate of about 5.5 ins. per minute. Fig. 2 is a typical load curve of the shovel taken while loading three trains during one morning of the test. A check was made against the chart by noting the starting time of each operation during the entire test. The test covered a period of seven days, work being done only during the day for the first five, and both day and night for the last two.



From the accompanying table it is seen that the power required for each cubic yard dug and lifted 70 ft. and loaded into a car, was approximately 0.8 kw.hr.

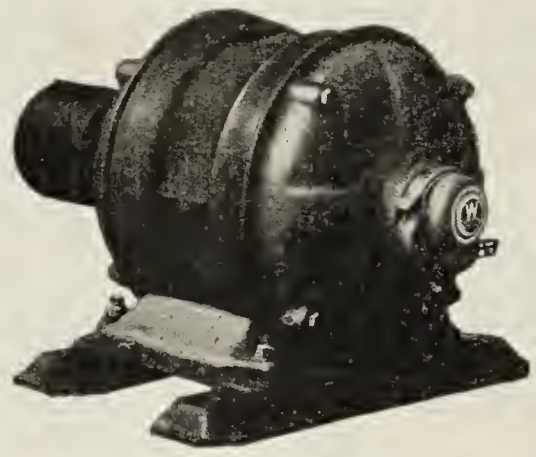
The graphic chart shows the energy consumption under actual working conditions and gives an accurate figure for energy consumption per cubic yard excavated. Fifty seconds were required to make the entire cycle. During this period a maximum power demand of 800 h.p. was reached. The average was 320 h.p. for the entire cycle.

An interesting feature of the operation of these shovels is the fact that regenerative braking is utilized whenever possible. In this particular instance it is used when the shovel is lowered the 70 ft. after it has been raised that distance in order to load the cars. This is accomplished as follows: When the operator is ready for the bucket to come down, the motors are connected to the power supply and the bucket falls with the motors running at slightly above synchronous speed. When such a condition is reached, the motors operate as induction generators. Although, as can be seen from the curve, some energy is generated and pumped back into the line, this item is not

the main feature of this operation. This method of lowering saves mechanical wear and tear, as the brakes are required only for stopping and holding the bucket, requiring less repair work and making the whole equipment more reliable.

Induction Motors

Leaflet 1160-A has just been issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., which illustrates and describes the features of the Type CS Squirrel-Cage Induction Motors of this company. These motors are constant speed, contin-



10 Hp. Type CS Squirrel Cage Induction Motor

uous rated from horsepower to 200 horsepower, 2 and 3 phase with 25, 40, 50 and 60 cycle, and 110, 220, 440, 550 and 2200 volts. In addition to the discussion on the motor and its parts, the Type A auto starter and the Type 815 motor starting switch for 10 horsepower motors and below are illustrated.

Estimating Cement Content for Concrete Highways

Here are some interesting facts for the highway contractor. There are approximately 40.7 cu. yds. of concrete in a 100-ft. section of 6 and 8-in. pavement 18 ft. wide. Practically all standard hand-books and tables specify 7 bags per cu. yd. for a 1:2:3 mixture, which is the one required to be used in the construction of reinforced concrete pavement. On this basis there would be an approximate total of 285 bags of cement used for a 100-ft. stretch of the reinforced pavement, and it is assumed most contractors place bids on pavement of this type, based on the estimate of using 285 bags of cement per each 100-ft. section.

The Pennsylvania State Highway Department does not attempt to state how many sacks of cement will be required to produce 1 cu. yd. of concrete; the specifications merely state that a 1:2:3 mix, accurately measured by volume, are required. The amount of concrete secured from 1:2:3 mix will vary, depending upon the amount of sand and stone used. It is understood that the state testing laboratory has found, after many experiments, that 289 bags of cement should be used (with most aggregate used) in a 100-ft. stretch of 6 and 8-in. pavement, 18 ft. wide.

It would be well for contractors to keep this matter in mind in placing bids on concrete highways, as the amount of cement required, as given in most tables, may be misleading, with many aggregates, to the extent of 4 or 5 bags of cement per 100 ft. of pavement.—*Associated Pennsylvania Highway Contractors' Bulletin.*

Large Blast at Concrete, Wash.

The largest blast ever fired in this region was set off at the Superior quarry of the Superior Portland Cement Co., just above Concrete, on June 9. The explosion was barely heard in town, and a slight tremor was the only apparent effect. Over 17,000 pounds of high grade explosives were used, and from 125,000 to 140,000 tons of rock were loosened by the explosion, sufficient to provide the needs of the cement plant for the balance of the year. The blast caused slight damage to the railway trestle, when it wrecked several bents leading to the quarry, caused by part of the huge mass of rock sliding down against the frame work of the trestle. Preparations for this blast have been under way for some time. The greater part of the explosive was placed in "coyote holes," bored into the face of the quarry for distances of from forty to fifty-three feet. A number of "well holes" were also drilled by Sanderson Cyclone drills, in order to leave a square face on the quarry after the explosion. The plans for the blast all proved successful, and although it entailed a great expenditure, the company figures that the operation will save money in the end, over the old system of blasting down small quantities of rock at a time.

Standardized Concrete Products Plants

W. E. Dunn, Mfg. Co., 414, 24th street, Holland, Mich., is distributing a large folder descriptive of the standardized concrete products plants this company is prepared to furnish. On the outer fold is a drawing of a man about to remove his coat and go to work in obedience to the stimulating slogan, "Let 1921 Be Your Busy Year." On the interior is found photographs and description of Dunn-equipped concrete products plants, Dunn drain and building tile machines and Dunn shovel mixers. This equipment is so well known to the concrete products manufacturers that it needs no further introduction. Profits in the concrete products business are determined by the kind of products made and the equipment and methods used rather than by the cost of raw materials. For that reason Dunn plants are profitable in any community.

An Old Principle in This Mill

The improved Griffin mill for pulverizing cement rock, coal, ores, etc., is the subject of Catalog No. 45, issued by the Bradley Pulverizer Co., Allentown, Pa. It is stated that the principle on which the mill is founded was used by the Indians, who pulverized corn between two stones. In the mill this principle, it is observed, is carried to the highest state of perfection by a chilled iron roll hung on a control shaft and revolved against and around a steel die, the centrifugal force creating a pressure of about 15,000 pounds per square inch. The illustrations show completely the construction of the mill and its operation is fully described by the accompanying letterpress.

A Score Board As an Accident Preventative

"It has been eight years since we first started the accident board. During this period we have answered thousands of letters from firms all over the United States asking for methods of operation, explanations and comparisons. Believing that our method is unique, interesting and worth-while, we are glad to give other manufacturers our experience with our sign board, writes the Dodge Manufacturing Company of Mishawaka, Ind.

"In the first place when the sign board was erected and planned there was no thought of the pioneering work that the Dodge Manufacturing Company was doing in welfare work. Our sole idea was to develop some means of cutting down preventable accidents in every department in our plant. W. L. Chandler, our Supervisor of Insurance, decided the best plan to do this would probably be to make use of a competitive spirit in workmen and foremen. Today, after eight years of operation, the score board is as much a pride to the worker-personnel as is a record breaking pulley or transmission equipment. One represents an achievement in human conservation and the other marks a milestone in mechanical progress—both of which are vitally essential to the success of a large organization.

"The size of the board as we erected it just inside the main gate of our No. 1 plant was 17 feet x 24 feet, which gave plenty of room for large lettering. The mechanism for scoring points is as simple and fair as possible. The starting point is 1,000, both for year and for month; each division is penalized according to its accidents; each day's absence bears a percentage charge in proportion to the total number of "men-days" per month per division.

"Our departments were divided into 26 divisions, according to the various degrees of natural hazard of variation in numbers of men employed. The degree of hazard is disregarded in our business which covers the some general subject throughout the plant; the differentiation being considered as equalized in the choice or selection of men with reference to their ability and fitness for their respective class of work.

"As to the variation in the sizes and groups of workers, we met this by establishing a differential charge per man per day for time off—which is computed by reducing each division to men-days for each month, and using a multiplier of 10 to raise the figures to a more workable and understandable basis.

"This system of scoring was finally arrived at after considerable experimental work and the present system seems to be fair in every respect and we have had no occasion to change it during the past few years in spite of the fact that during this time almost every known condition has cropped up.

"In the fourth column of this score board will be noticed the figures which represent deductions for absence in that division.

"Perhaps we have been too tolerant of the minor accidents which do not necessarily entail the loss of an appreciable length of time, as we do not penalize for any loss of time on the day of the accident. It is possible, however, by this means to secure a prompt report of all accidents, however small, so that we may be sure of proper attendance, and avoid, as far as possible such suffering as may be otherwise charged to secrecy on the part of either men or division superintendents.

EVERY EFFORT FOR SAFTY HELPS.

ACCIDENT PREVENTION SCORE-BOARD
DODGE MANUFACTURING COMPANY.

FOREMENS MONTHLY COMPETITION

All Departments Having a Score of 1000 or the Highest Three Scores, will Receive Special Prizes as per Monthly Prize List.

PRIZE LIST FOR MONTH OF Sept. 1913

$2.500.
Equally divided among the Foremen having a perfect Score

Number Dept.	Name Department	Name Foreman	Deduction For Absence	Percentage Month	Percentage Year to Date	Rank For Month	Rank For Year to Date
FOUNDRIES							
30	CUPOLA & YARDS	L. KING.	19.	1000	1000	1	1
17	CORE ROOM	G. SCHNAU.	10.	1000	1000	1	1
12	SOUTH	W. MIDDLETON.	7.5	1000	1000	1	1
15	HANGER	G. F. LONG.	14	976	963	3	17
14	PULLEY	J. BICKEL.	16	1000	991	1	11
18	PATTERN	E. GARTNER.	38	1000	1000	1	1
16	CHIPPING	J. STUFF.	6	976	979	2	16
MACHINE SHOP							
5	BEARING	J. MILLER.	15.5	1000	996.1	1	6
3	SHEAVE	R. PRIEM.	20.	1000	995	1	9
3A	MACHINE	J. ROUGH.	28.	1000	1000	1	1
3B	ERECTING	J. GONICK.	19.	1000	994	1	8
4	SHAFTING	W. MOURTS.	32.	1000	1000	1	1
6	CLUTCH	T. KENYON	10.	1000	999	1	2
2	IRON PULLEY	G. FRIEDMAN.	10.	1000	991.5	1	10
20	TOOL	G. PETERSON	28.	1000	981	1	14
WOOD SHOP							
1-A	SEGMENT	F. YOST.	115	1000	996.2	1	5
1-B	ARM	J. PHILION	32.	1000	949	1	16
1-C	ASSEMBLING	C. MARSH.	7.7	1000	993	1	9
1-D	FINISHING	C. DeGROOTE.	28.	1000	1000	1	1
OTHER DEPARTMENTS							
7	STEEL SHOP	G. HUNT	13.5	892	989	4	12
27	INSPECTION	G. McNEAL.	52.	1000	1000	1	1
25	SHIPPING	G. SHOBE	8.7	1000	996.4	1	4
21	YARD & SAW MILL	E. DILS	11.	1000	998	1	3
23	POWER	W. TUPPER.	38.	1000	1000	1	1
22	MILLWRIGHT	S. BRUBAKER.	26.	1000	981	1	13
19	METAL PATTERN	O. FORD.	104.	1000	1000	1	1

ANNUAL COMPETITION GENERAL

All Departments Scoring 1000 For the Year or the One holding Rank one in Yearly Percentage will Receive Two Days Pay Extra.
Second Highest will Receive One Days Pay Extra.

HEAD FOREMAN WILL PARTICIPATE IN FIRST PRIZE IF WON BY A DIVISION IN HIS DEPARTMENT

"At the end of each year the employees of the divisions scoring 1,000 receive two days extra pay, or such part of that amount as their time and employment bears to a full year. If none score 1,000, then the highest ranking division received the two days pay. General foremen of any division under them earning these premiums also participate on the same basis but may earn but one prize if other divisions under them make a perfect score.

"Our original plan was to distribute $25 in cash each month to all foremen of divisions winning perfect scores, but due to the relative importance and the efforts of the foremen with a widely varying number of men to deal with, we were, in all fairness, obliged to change this arrangement so that one-half of each prize is paid on a flat basis and one-half distributed according to the number of men overseen; thus a foreman in charge of 50 men will get a proportionately larger premium than the one in charge of 10 men.

"It will be noted that the cash prize is small, and to some it may be even considered as trivial, but it was our intention not to make the men strive *only* to secure the cash prize as much as to awaken in them a healthy competitive spirit. In this we have succeeded beyond our fondest hopes for a competition is keen and constant.

"Every member of each division is keenly alive to the fact that responsibility for keeping his division with a perfect score rests squarely on him—consequently, he gauges his work and actions to conform with all the precepts of safety-first. This interest is stimulated and fostered by making up the yearly basis out of the monthly average. The great thought is then concentrated on the yearly contest, and the discouragement of any unfavorable monthly showing is avoided because any other division may have a penalty sufficient in some months throughout the year to equalize these unfavorable periodical conditions.

"So keen does the competition become that more than once considerable tact and diplomacy had to be used in some divisions where the carelessness of an individual caused a disabling accident.

"As a means of preventing accidents the score board has rendered excellent service for us. It is no uncommon occurrence to have 10 divisions out of 26 showing perfect scores. Included in some of our perfect scores is our Steel Foundry where we make castings weighing as high as 50 tons. This work is usually classed as hazardous.

"Some divisions have perfect scores year after year and there is hardly a single division that has not shown marked decrease in accidents during the past eight years.

"In addition to the sign board we also maintain a safety first organization among our workers that deserves much credit for our extremely low accident experience in our many departments. We unquestionably recommend our plan to any manufacturer, and know any organization will find a similar plan to be well worth while.

Lehigh Cement Co. Holds Safety First Contest

The safety campaign at the Lehigh cement plant at Mason City, Iowa, which is being conducted by the safety committee for the month of July in an endeavor to make a "No Accident Month" have so far been successful as up-to-date has been no accident.

This week H. G. Jacobsen, manager, bureau of accident prevention Portland Cement association of Chicago, Ill., was in Mason City in connection with this campaign having come from Iola, Kans., where he had been assisting in the work there. Mr. Jacobsen has been in safety work for 12 years and is very enthusiastic over it, and is very prominent in safety work throughout the country. He spent the entire day here instructing the foremen and men in safety work.

Every Lehigh workman all over the United States is wearing a safety button this month with the words "Safety First."

New bulletins are posted every day on the company bulletin boards and in every department. One favorite bulletin that a department likes, reads "We had no Accident Yesterday." So far all departments have been able to keep this bulletin up.

On July 1 the first period of the campaign closes and all mills will telegraph to their Allentown, Pa., headquarters the number of accidents and days lost. This information will be worked up into a comparative statement and sent out to every mill showing its standing in the campaign.

The following is "The Safety Pledge" which is taken by all Lehigh employees:—

"I will be safe for there are
Those who trust me.
I won't take chances
There are those who care.
I won't be careless
There is much to suffer.
I'll be a booster
And I'll do my share
For safety."

To all Lehigh employees:—

This is what safety work means:

"And the end is that the workman shall live to enjoy the fruits of his labor; that his mother shall have the comfort of his arm in her old age; that his wife shall not be untimely a widow; that his children shall have a father, and that cripples and helpless workers who were once strong men shall no longer be a by-product of industry."

News of the Crushed Stone Plants

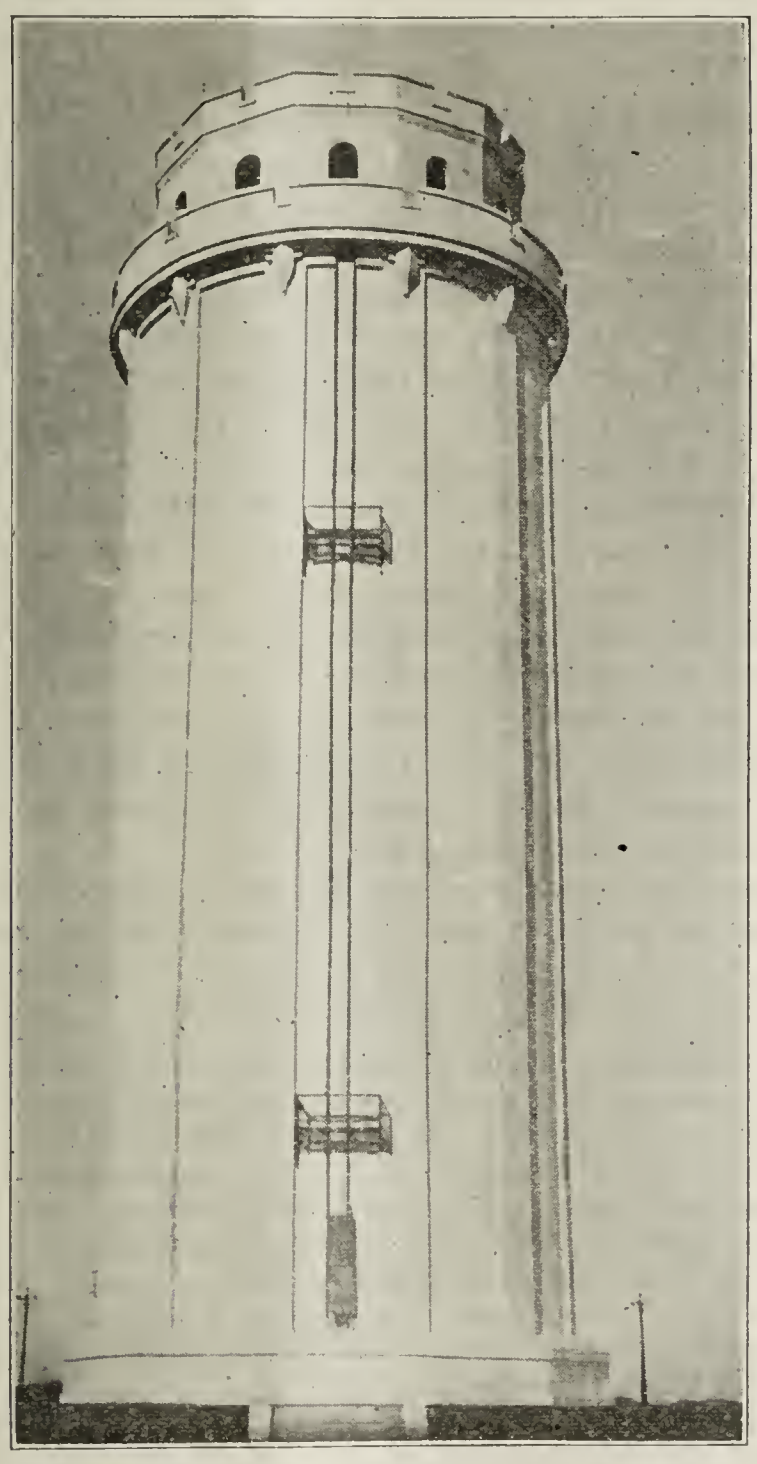
The record of the Monmouth Stone Company, Monmouth, Ill., during the past year, have been one of steady progress. This is a new company operating a large quarry at Gladstone, Ill., equipped with the most modern machinery, including a Sanderson Cyclone electric drill and a No. 12 and four No. 5 Allis-Chalmers Crushers.

The Superior Stone Company, La Grange, Ill., has recently added 50% to its manufacturing space and thereby relieved a congestion that has been a drawback for several years. With working quarters greatly enlarged, the company is now prepared to handle its share of the expected increase in the crushed stone business both quickly and efficiently. They operate four Allis Chalmers crushers, a No. 18, No. 8, two No. 5 and one set of rolls, also Sanderson Cyclone big blast hole drills.

The Casper Stolle Quarry & Contracting Company, East St. Louis, Ill., reports splendid business and bright prospects. They operate three Allis Chalmers crushers, numbers, 8, 6 and 5 and a Sanderson Cyclone Drill.

Concrete Water Tank

The Stand-pipe or Water Tank built in Kansas City in 1919 to provide a reservoir of water for the south section of the city, was designed in the office of the city engineer, following closely the design of one built in Fulton, N. Y. It is hardly properly called a Stand-pipe, which is the name by which a metal reservoir placed at the top of a structural steel frame is usually known. The tank is a plain circular concrete tank, differing from those usually used for storing grain, only in that there are pilasters extending the entire height and that the walls are thicker, and further, that it is surmounted by an ornamental turret.



Substantial and attractive water tank built in Kansas City

The tower, which rests upon a concrete base four feet in thickness re-enforced by steel bars, has an inside diameter of 40 feet and a height of 110 feet. Concrete consisted of 1:2:4 mixture and was poured in one continuous operation. The walls have a uniform thickness of 18 inches and are re-enforced by two courses of steel bars, one inner and one outer course. These are 12 pilasters six inches thick and four feet wide. On top of the wall is a walk four feet wide extending two feet outside and two feet inside of the center line of the circular wall. An ornamental wall surmounts the walk on the outer side and the turret walls protect it on the inner side. A roof of re-enforced concrete, carried on I-beams, covers the top. A steel ladder extending to the walk at the top leads from the base with two ornametal steel balconies placed one at 40 feet and one at 80 feet from the ground. A square base of earth is terraced to a height of six feet and a concrete sidewalk surrounds the tank at the top of the terrace with a stairs leading to it.

No water-proofing was used either in the concrete or upon the walls. As the walls were exposed by the moving of the forms they were trowled and brushed with a cement wash both inside and outside.

The contract was let on June 11, 1919, to the Finton Construction Company of Kansas City, which specializes in concrete grain storage tanks. Work was begun on July 1st. Because of a thirty day delay in obtaining steel and an exceptionally cold period in the fall, the work was not completed until spring though the main walls of the water tank begun on Oct. 1st, were run in 14 days. The bad weather caught the work on the ornamental turret.

The building of the main walls was done by means of moving forms such as are used in the building of grain storage tanks. These forms, consisting of inner and an outer circle four feet in height, are built of wood in sections and are placed in position upon the foundation slab. The inner and outer forms are held in their relative positions by means of yokes formed of timbers through which pass vertically one inch plain round rods. Upon these rods operate jaks designed to climb the rods and draw the form upward as the concrete is poured in at the top and sets sufficiently to stand. Attached to the inside of the inner forms are joists on which a floor is laid. Upon this floor the concrete is hoisted in a tower built outside the tank is carted in carts the re-enforcing steel handled and all work on the walls done. A railing is built outside of the outer form. The workmen are thus working upon an enclosed floor with nothing above them to fall. The work is much less hazardous to workmen than other kinds of concrete construction or other of the ordinary kinds of building.

The workmen go from the ground to the top upon an enclosed stair attached to the hoisting tower.

The only accident to a workman during the entire progress of the work was to a workman upon whose finger a bar was dropped by a fellow workman.

Effect of Cold Storage on Cement

Results of Twenty-five Hundred Tests Show Deterioration of Strength Under all Conditions and Lengthening of Time in Setting.

Researches in the properties of concrete and concrete materials at the Structural Materials Research Laboratory are being carried out through the cooperation of the Lewis Institute and the Portland Cement Association, Chicago. At the April meeting of that association, Duff A. Abrams submitted a report on certain tests of the effect of storage of portland cement in different kinds of packages and under different conditions on its concrete and mortar-making properties. The following is a summary of that report:

Tests were made on three different lots of portland cement, which had been in storage for periods up to two years. The cements were stored (A) in the laboratory; (B) in the basement of the building; and (C) in a shed in the yard. In general the cement was stored in lots of 800 to 1,200 pounds, in standard cloth sacks; in one group of tests two brands of paper sacks

were also used. In another group the cloth sack containers were covered with thin layers of (1) portland cement and (2) hydrated lime. Tests were made at ages of 7 and 28 days, 3 months, 1 and 2 years, on samples taken immediately upon receipt from the dealers' warehouses and after storage for 3 and 6 months, 1 and 2 years.

This report includes compression tests of about 1,000 6x12-inch concrete cylinders, about 1,000 2x4-inch cylinders of 1-3 standard sand mortar, and about 500 miscellaneous tests. Tests have been under way for 3½ years; some of the later tests are incomplete as this report is written.

The following are the principal conclusions from this investigation:

(1) There was no essential discrepancy between the indications of the compression tests of 1:5 concrete in the form of 6x12-inch cylinders and the tests on 1:3 standard Ottawa sand mortar in 2x4-inch cylinders.

(2) Compression tests of concrete and mortar showed a deterioration in strength with storage of cement for all samples, for all conditions and periods of storage and at all test ages. The deterioration was greatest for the samples stored in the shed in yard, and least for the samples stored in the laboratory. The basement storage was nearly as severe as outdoor. The deterioration was greater during the first three months than for later three-month periods. A greater deterioration was found in the tests made at the age of 7 days than at 28 days and later test ages.

(3) After three-month storage is shed in yard the cement had 80 per cent of its original strength; after six-month storage, 71 per cent; after one-year, 61 per cent; after two-year, 40 per cent. The deterioration was probably greater in these tests than would be found in a larger lot of cement stored under similar conditions.

(4) The effect of storage of cement on the concrete or mortar strength is largely a question of the age at which concrete or mortar is tested. The average strength of cement stored in shed in yard when tested at seven days (for all periods of storage), is 64 per cent of the strength when received from the warehouse; at 28 days, 71 per cent; at 6 months, 78 per cent, at one year, 82 per cent, and at two years, 85 per cent. A somewhat similar relation is found for other storage conditions. It is a matter of the utmost importance to note that the strength of concrete is not permanently reduced to the low values found in the 7 and 28-day tests.

(5) For periods up to 1½ years there was no marked difference in the quality of cement stored in cloth and in paper sacks. The two brands of paper sacks gave almost identical results.

(6) Only a slight advantage was found from the protection of cement in cloth sacks which were covered by thin layers of Portland cement or hydrated lime. The results obtained do not justify the cost of this method of protecting cement stored in sacks.

(7) The most favorable storage condition (in laboratory) and the least favorable (in basement and shed) gave strengths of the same order of magnitude; indicating that the possibilities of improving the storage condition of cement in sacks in this climate is rather limited. The storage period and the age of the concrete or mortar at test are of greater importance than the exact condition of the storage, so long as the cement is protected from direct contact with moisture.

(8) Storage of cement prolongs the time of initial and final setting.

(10) The normal consistency was only slightly affected by storage.

Limiting Motor Truck Loads

No class of pavement has yet been suggested as practicable which can withstand the heaviest loads which truck manufacturers can construct their vehicles to carry. Even the toughest granite block pavement would rapidly wear away were a railroad locomotive to pass frequently over it, while most of the soils available for highway foundations would yield under such enormous weights even though covered by the thickest practicable foundation. It seems to be generally admitted, therefore, even by the manufacturers of trucks, that it is necessary to place some limit on truck weight in order to prevent the rapid destruction of the roads.

Discussing this subject, R. E. Fulton, vice-president of the International Motor Company, has stated recently that "It is but equitable that those vehicles which cause the greatest amount of damage to the roads should be restricted in their use at the present time, and that in the future they should contribute the largest share toward road repair costs." He cautions, however, against reducing the maximum load to too low a limit, using the following figures in support of his belief. He states that 300,000,000 tons of material were shipped by truck in 1919. If this had been carried by one-ton trucks it would have meant 900,000,000 tons passing over the road, 600,000,000 of it being the weight of the trucks. A 7½-ton truck, however, weighs somewhat less than 7½ tons itself, and consequently if the 300,000,000 tons had been carried in 7½-ton trucks, the roads would have had to bear only 600,000,000 tons of traffic.

The amount of material which must of necessity be carried by trucks is increasing rapidly, partly because of the lack of railroad transportation facilities. If a given amount of such material must be carried by 2½-ton trucks instead of 7½-ton trucks, it will mean three times as many vehicles and probably double the burden on the roads. This will mean increased road wear as well as increased cost of transportation.

The light-weight truck has the advantage over the heavier one of greater speed, and must utilize this advantage to minimize the cost of transportation. This increased speed, however, produces road wear in excess of that caused by the heavy truck, although carrying a much less load.

Another point introduced by Mr. Fulton is that of impact. He states that the tests of the United States Bureau of Public Roads show that the road impact is the real cause of road wear and that the "unsprung weight" is the controlling factor in road impact, unsprung weight being that part of a truck's total weight which hits the road a direct blow undiminished by springs. For this season a chain-drive truck, in which all of the driving mechanism is carried on the frame above the springs, has less unsprung weight than a shaft-driven truck, in which the entire weight of the final drive and its housing rides directly on the rear axle below the springs.

"The tests at Washington showed that a 5½-ton chain driven truck produced only 68 per cent of the road impact delivered by a 3-ton shaft driven truck, although the larger truck naturally carried a heavier load."

Building a N. J. State Highway of Concrete

Four and One-half Miles of 18-foot Concrete Highway at Pompton Plains Well Equipped With Sand, Gravel and Stone Producing Facilities and Well Selected Construction Plant Insuring First-Class Results

Section 1 of route 8 of the New Jersey Highway Department consists of about 4½ miles of concrete roadway 18 feet wide, 6 inches thick at the edges and 8½ inches thick at the crown, and having on each side a shoulder surfaced with 3-inches of bituminous macadam 3 feet wide, adjacent to which is a French drain 8 inches wide on top with an open-joint pipe laid in the bottom and covered with broken stone.

The road has a nearly straight alignment with maximum grades of 1 per cent and is located on the line of an old macadam road 24 feet wide. The new grade varies somewhat from the old, being in most cases above the latter, and requiring about 1,000 yards of excavation and 9,000 yards of fill derived from the contract excavation and from the sand pit.

The construction involves about 20,000 linear feet of French drain, 3,000 feet of 12, 15 and 18-inch agricultural tile drain-pipe, four drainage ditches with an aggregate length of 3,500 feet, 2,000 linear feet of wood hand rail, 100 linear feet of pipe rail, 5 brick manholes, and about 12,000 cubic yards of 1:2:3 concrete foundation made with Penn Allen cement and ¾-inch and 1½-inch trap-rock, and 16,000 square yards of 6-inch asphaltic macadam surface. The contract was awarded, on a unit cost basis, to the firm of Harrop & Shannon for about $200,000.

Sand Pit

The road passes through the village of Pompton Plains, which is about midway between the extremities of this contract section. The contractor's headquarters are established there in charge of James R. Donnelly. A few hundred feet from his office, the contractor has opened a sand and gravel pit where a ½-yard shovel has stripped off the loam from a 300 x 500-foot area to a depth of from 5 to 8 feet, and another shovel of the same make and size is digging, for the screening plant, sand and gravel from a cut about 25 feet wide and 10 feet deep that extends across the full length of the sand pit.

The sand excavation shovel delivers to three 1-yard side-dump cars hauled over 24-inch gage industrial track and dumped into the depressed hopper of a bucket elevator, which raises the materials about 30-feet to the set of three cylinder screens. These discharge into overhead storage bins of about 150 yards capacity which are divided into three compartments for sand, coarse gravel and fine gravel respectively.

The horizontal floor of the bin is pierced with three holes commanded by sliding steel gates 10 feet above the roadway, by levers that provide for the discharge of sand and gravel into 5-yard automobile trucks spotted on the service road under the bin. The screening and elevating plant is operated by a 20 h.p. steam engine, and has a capacity of 150 yards per day.

The capacity of the excavating shovel is nearly twice as much as that of the screening plant and part of its product is delivered directly, without screening, to automobile trucks that enter and leave the sand pit on a plank incline and deliver the unscreened sand to purchasers who use it for fill and to the contractor's own trucks for use as fill on the low part of the contract. Four trucks of 4 and 5 yards capacity haul the fill a maximum distance of two miles, making a round trip in about 40 minutes.

Stone Quarry and Crusher Plant

Trap-rock for concrete is produced at the rate of a little more than 100 yards per day in a quarry leased, opened and equipped by the contractor on a hillside about 4½ miles from the most remote point of the contract and operated on sub-contract by an independent superintendent.

This quarry has a nearly vertical face about 40 feet high and 100 feet long, requires little stripping and furnishes satisfactory materials which break into small-size stones without much block drilling or sledging. Usually the ledge is shattered by drilling two tiers of holes about 20 feet deep and 8 feet apart in both directions. The holes are drilled by a Sullivan drill, operated by steam, and each vertical hole is charged with cartridges of 60 per cent dynamite.

The shattered stone is loaded by hand into dump cars on industrial tracks and pulled by teams a maximum distance of 150 feet to the 12x24-inch jaw crusher, the product of which is handled in a standard screening and storage plant having overhead bins with about 100 yards capacity provided with five bottom gates through which the stone is delivered to trucks. The average product of the quarry is about 20 yards of screenings, 15 yards of ¾-inch, 50 yards of 1½-inch and 40 yards of 2-inch stone in one 9-hour shift. The 2-inch stone is rejected from the screens and is re-crushed in a Farrell crusher which is operated about half the time and delivers to a smaller portable bin, with a capacity of 40 yards storage and four side spouts for loading trucks. The stone crushers are operated by a 10x12 inch traction engine with a 50-h.p. steam boiler, which also supplies steam for the rock drill.

Concrete Pavements Serve Heavy Traffic

Contractors Yard

Adjacent to the sand pit, the general equipment and storage yard for the work has been established, with a 200-foot railroad track siding, one end of which is occupied by a 14x75-foot cement storage shed with a capacity of about 5 carloads or 1500 barrels. There is a 12x24-foot tool shed, an 8x12-foot gasoline shed (in which there are generally maintained ten 60-gallon tanks), an 8x12-foot oil house containing five 60-gallon tanks and various small barrels and tanks for kerosene, lubricating oils, etc. There is a 10x10-foot smith shop, several small sheds and a 20x20-foot mess and bunk tent.

There is also a 10x12-foot empty bag storage shed in charge of a man who is constantly employed in gathering up bags, shaking and folding an average amount, when the work is in full progress, of 900 bags a day which, at the present price of 25c each, makes an important item of saving and allowing for losses

should amount to over $30,000 for the 125,000 bags required on the contract. It has been found necessary to pay particular attention to this point because, without it, large numbers of bags are lost, stolen or destroyed.

Besides the trucks employed in handling the materials, there is a 1½-ton motor truck with a detachable cover used for general service and for bringing the men back and forth from their work. The superintendent also has a five-passenger touring car in constant service.

Construction Operations

Where there is no excavation, the surface of the road is loosened by rooter plows (of which there are three) drawn by one of the two 10-ton Austin rollers. The fill, if any, is deposited on the prepared surface and rolled to grade with an accuracy of about ½ inch.

Abundance of broken stone and sand delivered by the automobile trucks are always deposited on the subgrade in advance of the concreting, sufficient for at least two days supply. Considerable difficulty has however been experienced in securing cement, the lack of which has frequently caused the concreting to be shut down entirely for several days at a time.

Finishing Concrete Road in Rear of Paver

At the site the cement is stored in lots of 200 bags which are piled solidly on 20-inch x 22-foot platforms made of a pair of 2-inch planks cleated together and covered with heavy tar paper. With each platform there is provided one 18x30-foot or one 15x25-foot tarpaulin to protect the cement bags from rain.

A large number of steel forms are provided and are kept set for about 200 feet in the rear of the concreting machine and for about 900 feet in advance of it.

The concrete is mixed in a 1-yard Jaeger machine supplied by 11 wheelbarrow men. The concrete is laid in sections 12 to 15 feet long, with expansion joints 75 feet apart, at an average rate of 300 linear feet in one 9-hour shift, a speed which it is expected will be increased if a sufficient supply of cement can be maintained in advance.

After the concrete has been placed it is finished by a Boss mixer operated about one-half the time. In special places, however, wherever the consistency of the concrete requires it, the road surface is additionally finished by working with a long-handled two-section hand roller.

Water for the concrete mixer and for saturating the hay with which the fresh concrete surface is kept covered for several days after its completion, is delivered along the full length of the line through a special pressure pipe installed by the contractor, which is supplied from a very large spring a mile from the roadway, where there is located a 2x3x3-inch steam pump

Fresh Concrete Covered with Wet Hay

which maintains a pressure of about 80 pounds in the 2½-inch pipe line which is reduced to 2 inches at the further end. The line is run in both directions and pieces are taken off at one end and put on at the other as the work advances.

In order to protect the fresh concrete from rain, there are provided enough 12x18-foot covers to suffice for one day's run and these, being kept always a short distance in the rear of the concrete machine, can be almost instantly put in place on the approach of a storm or when the work is left at night. Each frame is a skeleton roof about 24 inches high in the center and with a pitch of 10 inches from the longitudinal line in both directions. It is covered with chicken wire on which there is a layer of the best tar paper. Each frame can be quickly and easily handled by four men and their use gives security against any damage by violent showers.

The full mixer gang requires about 30 men and the maximum force employed on the entire contract at one time is 75 men, who receive as high as $7 each per day for common labor.

Saving Money on Bags

Cement bags are made of strong cotton fabric, well sewed, and are built to withstand heavy service. With good treatment they will make many trips from the mill to the consumer. They will not, however, stand up under the kind of abuse that is often dealt out to them—the commonest kind of which is the careless exposure of the bags to moisture in any form. Cement mixed with water soon hardens, and the cement dust in the meshes of a used bag will act identically the same if water reaches it. The texture of the bag becomes stiff, and particles of hard caked cement adhere to the body and seams. Bags in this condition may be all right in every other respect, but they cannot be used again by the manufacturer for shipping cement,

The Bag Campaign which has been conducted by the cement industry for the past year has done more than bring back bags to the plant. It has taught the value of conserving bags—not only getting them back promptly, but handling them carefully, storing them in dry places safe from theft, and bundling and tagging them properly, so as to avoid losses in transit.

We see evidences of the additionl thought that is being given this question in the smaller percentage of rejected bags received and in the appearance of the bags generally. It is a good thing for the dealer and contractor, as it saves money for both and removes the grounds for many controversies. The manufacturer also benefits and his path is made much easier in handling bag questions with his customers.

It is not to be expected that in a situation like this where results depend almost entirely on the constant watchfulness of yard men, foremen and superintendents of numberless jobs, that the abuses, some of which we mentioned and which cause the loss of vast quantities of bags and thousands of dollars, will be stopped overnight. There will continue to be cases where bags will be left around yards or jobs exposed to all sorts of weather, used for carrying wet sand and other materials, or neglected in a dozen different ways that will injure them and cause their rejection when they are eventually returned to the mill.

These cases, however, will become fewer as a clearer realization of the value of the bag becomes more general and we shall gradually reach a degree of efficiency in caring for and returning these valuable containers that will be of immeasurable benefit to everyone concerned.

Note: If you are not using a bag baler we recommend to you such a machine. They are a great convenience in tying bags for shipment, and are a real economy in that the work is done with less labor, the bundles tied by such machines reach the mills unbroken and the loss from broken bundles in transit due to improper tying is reduced to a minimum.. Names of manufacturers of such machines will by furnished by Cement & Engineering News, 22 Quincy St., Chicago.

News of the Cement Mills

Kosmos Portland Cement Co., Louisville, Ky., are in the market for a centrifugal pump, motor and base, direct connected, capacity 4,000 G. P. M. against 150 ft. head. Also for set crushing rolls 24" Dia. x 30" length.

Castalia Portland Cement Co., Castalia, O., has recently motorized its entire plant. A new Hardinge mill has been installed also another 42-in. Fuller mill in the coal grinding department, making three Fuller mills in all.

H. G. Loeffler is now with the Monarch Cement Co., Humboldt, Kansas, in charge of construction and John Hall has been oppointed chief chemist of the Monarch Co.

B. J. Latimer has resigned as chief engineer of the Southwestern Portland Cement Co., El Paso, Tex., and accepted the position of Superintendent of the Nebraska Cement Co., Superior, Neb.

Figures purporting to be the exact earnings of the Missouri Portland Cement Co. of St. Louis for the last eight years, were given in the testimony of B. G. Coyle, assistant to the president of the company, at the hearing being conducted by Attorney General Barrett under the State's anti-trust laws into conditions in the building materials trade in St. Louis.

The figures of earnings of the St. Louis mill of the company showed that in 1920 it had the biggest year of the last eight, earning 20.2 per cent, while its highest previous earning was 13.9 per cent in 1916.

The profits of the mill for the eight years were given by Coyle as: 1913, 9.5 per cent; 1914, 9.2; 1915, 7; 1916, 13.9; 1917, 11.9; 1918, 7.3; 1919, 7.8, and 1920, 20.2.

The average price per barrel of cement at the mill in 1913, he said, was $1.06½, and in 1920, $2.06.6. The average cost of production per barrel was 82.9 cents in 1913, and $1.94½ in 1920. The profit per barrel in 1913 was 23.6 cents, and in 1920, 12.1 cents.

Lehigh cement mill boosters at Mason City, Ia., have entered a Safety First contest in which the 15 Lehigh mills with the one at Allentown, Pa., at the head have entered.

During the month of July the Lehigh cement safety committee, which Oscar Davis, superintendent of the Mason City mill, is president, will endeavor to do away with or lessen accidents both at the mill and at the homes of workmen.

The millyards are to be cleaned and painted, old scrap is to be carted away and a general cleaning up is to be commenced July 15. The winning mill will get a 6x12 pennant from the Allentown headquarters.

A movie, "Careless America" and "The Only Way," will be shown employes continuously Friday and Saturday afternoons and evenings. The film will show the proper method of safety precaution in cement mills.

Exercising its option, secured a year ago, the Davenport Cement Company, recently incorporated for $3,000,000, just purchased a 402.8 acre tract adjoining the town of Buffalo, Iowa, on the east for a consideration of $800 an acre, or a total of $342.240.

The purchase, the officials say, insures the ultimate erection of a $2,000,000 cement plant with a daily output of 2,000 barrels. Plans have been prepared for the new mills which will cover approximately 30 acres, but actual construction work will be deferred pending a stabilization of business conditions.

The company secured options on the property a year ago and started work investigating the soil conditions to determine if a cement plant would be feasible. The Robert W. Hunt & Company, of Chicago, was engaged to conduct the investigations at a cost of $15,000.

According to the engineers the conditions for the manufacturing of cement at a minimum cost are ideal. Approximately 200 acres of the land are free from an overburden of soil, averaging less than three feet to the rock bed.

This fact alone, officials say, will eliminate the expensive stripping process and result in a saving of between $10,000 and $20,000 per acre. The soil in spots is so thin, the engineers say, that no stripping will be necessary for the reason that the surplus soil can be burned up in the kilns without injury to the product.

The remaining 204 acres are composed of shale and clay formations. The conditions which enter into the manufacture of the cement are so near ideal at this site that it may be possible to use the dry process of manufacture in place of the wet process at a considerable saving in manufacturing costs.

Two trunk lines—the Rock Island and the Milwaukee—cross the property assuring adequate shipping facilities to any point within the territory to be covered by the new company. The land has a frontage of one mile on the Mississippi with facilities for docks if desired. Two miles of switch tracks will be laid when the plant is erected and in running order.

Joe R. Lane is president of the company. William R. Mueller is vice-president, Charles Shuler is secretary and treasurer and E. L. Cox, formerly of Chicago, is general manager. The above officers together with M. E. Ochs and R. B. Cook constitute the board of directors.

When the company was organized 30,000 shares of preferred stock with a par value of $100 and 30,000 shares of common stock with no par value were voted. The preferred stock is owned by the incorporators. The common stock has never been placed on the market. No difficulty is anticipated in financing the new plant when the proper time comes, officials say.

R. F. T. Weston, for the past four years superintendent of the New York state plant at Portland Point, N. Y., of the Penna Cement Co., has severed his connections. His future connections have not been made known as yet.

F. J. Adams has been appointed superintendent of the Bonner Portland Cement Co., Bonner Springs, Kan., to succeed U. S. Hannum, who resigned, effective April 1.

The state public service commission of Missouri issued an order today requiring the Santa Fe railroad to cancel a tariff which proposes to materially increase the charge for switching car load shipments of cement from the plant of the Missouri Portland Cement Company, near Sugar Creek, Jackson county, to Kansas City. As

a result of complaints filed by cement plants in other states, Illinois and Kansas, the interstate commerce commission found that the switching charge of 2 cents per one hundred pounds made by the Santa Fe from the plant near Sugar Creek to Kansas City discriminated against plants in Kansas, Illinois and at Hannibal, Mo., that paid a road haul rate and found that the rate from Sugar Creek on cement, alone, should be advanced to 5 cents per one hundred pounds.

A 15-ton Jeffry locomotive has been ordered for the quarry of the Colorado Portland Cement Co. at Portland, Colo. Being of the trolley type, and capable of hauling 10 or 12 cars from the quarry to the crusher, it will speed up this end. A new track has been put in the plant yards to facilitate the handling of coal car loads.

A Williams hammer mill has recently been installed in the raw end, which increases the capacity there, and enables the crowding of the kilns to the limit.

F. Stugard, formerly superintendent of the Kosmos Portland Cement Co., at Kosmosdale, Ky., has resigned his position with the Kosmos company. E. J. Davis, formerly with the Fuller Engineering Co., is now superintendent in charge of the plant.

Theodore Rassieur, attorney for the Continental Portland Cement Co. of St. Louis, at the inquiry into the building materials price conditions appealed to Attorney-General Barrett to "go slowly and carefully" in instituting prosecutions for supposed violations of the anti-trust laws.

Asking permission to make a statement before witnesses for the Continental were examined, Rassieur referred to President Harding's "New York hands-off business speech."

"Probably you intend to be guided by the same policy," he said to Barrett. "If there have been violations of the antitrust laws you probably will prosecute them. On the other hand, you want to go carefully and slowly. No matter what cry may be heard with regard to the high prices of building material, so far as my client is concerned there has been nothing in its history in the nature of a violation of the Missouri antitrust laws of the Sherman act."

Rassieur then outlined the condition of the Continental. He said it was organized in 1907, but lost money each year until 1915. It was reorganized in 1915, he said, with $150,000 of new paid in capital, and that year made a seeming profit of $51,292, though, he said, that figure did not make any allowance for depreciation, and that if there had been the same depreciation allowance as in future years, there would have been a loss of $4,958. The profits for succeeding years he gave as: 1916, $145,638; 1917, $181,000; 1918, $108,000; 1919, $108,000. In 1920, he said, the company lost $49,734.

This loss he accounted for by the statement that the company was building an addition to increase its capacity from 2,200 barrels of cement a day to between 4,000 and 5,000 barrels. The work on the addition, he said, impaired production.

He gave the production cost for the Continental at: 1915, 75 cents; 1916, 79 cents; 1917, 94 cents; 1918, $1.14; 1919, $1.32, and 1920, $1.67.

The average mill price of cement he gave as: 1915, 95 cents per barrel; 1916, $1.17; 1917, $1.49; 1918, $1.71; 1919, $1.76, and 1920, $2.02.

The net profit per barrel he gave as: 1915, 1 cent; 1916, 17 cents; 1917, 28 cents; 1918, 23.6 cents; 1919, 10.7 cents. He said there was a loss in 1920, but that the amount per barrel had not been figured.

During a six-year period, he said, the company had earned an average of 4.56 per cent on its investment, which was $1,711,000 in 1915 and $1,902,000 in 1920, not figuring the addition, which when completed will have cost $1,000,000. During all that time, he said, the company had paid dividends of $60,000 a year on an outstanding capital of $600,000. Arthur W. Harrison, treasurer of the Cape Girardeau Portland Cement Co., of Cape Girardeau, Mo., testified the price for barrel of cement in Cape Girardeau was $3 with a 40 cents refund for sacks, making the net price $2.60. Rassieur interrupted with the statement that the mill price quotation at Hannibal today was $2.10..

Harrison testified the Cape Girardeau company had paid only two dividends, one of 3 per cent in 1918 and one of 6 per cent in 1919. He gave the profit per barrel of his company at: 1913, 20 cents; 1914, no figures given; 1915, 6 cents; 1916, 16 cents; 1917, 35 cents; 1918, 15 cents; 1919, 29 cents. In 1920 he said, there was a loss of 20 cents a barrel.

The return on invested capital, he said, was: 1914, 1.6 per cent; 1915, 2 per cent; 1916, 6.7 per cent; 1917, 11.2 per cent; 1918, 4 per cent; 1919, 9.5 per cent, and 1920, 1 per cent.

A. C. Tagge, general manager of the Canada Cement company, of Montreal, inspected the new plant of the Petoskey Portland Cement company last week. Mr. Tagge reports his company, which operates seven cement plants, plans to make a number of improvements in its plants.

Others here inspecting the plant incude J. R. Ginde, general manager of the Dixie Portland Cement company, Chattanooga, Tenn., and W. H. Klein, superintendent, and E. Shaw, assistant superintendent of the same company. T. H. Wilson, works manager and engineer of Wilsons (N. Z.) Portland Cement, Ltd., Auckland, New Zealand, accompanied by his wife, is making a tour of the United States and Eastern Canada. Mr. Wilson is visiting various cement plants along the way and he inspected the Petoskey plant last week. After visiting England he will return to New Zealand by way of New York, Chicago and the Candadian Northwest.

A new wet process unit consisting of one kiln 9 ft. by 190 ft., and the necessary grinding equipment, is being installed at the plant of the Wilsons company. Difficulties due to coal shortage have largely been overcome. A coal mine situated about 16 miles from the plant has been purchased by the company, and the coal will be transported over the government owned railroad.

All have expressed surprise at the many modern features at the Petoskey mill which tend to save labor and considerable time in the cement making process. The company have already shipped several boat loads of cement to Milwaukee.

Gilmore Portland Cement Corporation, Gilmore City, Iowa, has installed a Bradley-Hercules mill to grind raw material, which has produced an average of 40 tons plus per hour to a fineness of 60% through a 100-mesh sieve. The mill takes rock 2½-ins. and under and reduces for tube mill finishing. The exceptionally fine product derived from the Hercules mill increases the output of the tube mills at least 25%, permitting a better fineness from the tube mills which, in turn, increases the output of the kilns. They have also installed a Giant Griffin mill in their coal grinding department.

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Du Pont Products Exhibit
Atlantic City, N. J.

News of the Concrete Products Factories

The Margranite Products Co., North Little Rock, Ark., is making concrete faced brick in white, gray, buff, brown and red, with an attractive rough, typically face-brick texture, employing equipment which originated with the Margranite company. It was developed by its superintendent, C. A. Booher.

The equipment is a gang mold, which forms 100 brick at each operation, with the face side upwards. The mold is in reality a dye, in one solid grill of cast iron, beneath which is a framework supporting two fingers under each of the 100 molds. These fingers support thin wooden pallets, which drop loosely into place. A bag drops the small wooden pallets into the molds. The molds are then filled with a stiff and well mixed concrete, (mixed in a Kent Continuous mixer) made of 1 part cement, 2 parts sand and 2 parts crushed stone. This is tamped into the molds with a series of rapid operations by two men down each side of the gang mold.

The Besser Sales Co., 305 Monadnock Block, Chicago make the following announcement:—

"The rapidly increasing use of Besser Automatic Equipment for the economical production of concrete products has made it necessary for the Besser Sales Co. to carry out further expansion. Our sales offices have been moved to Chicago, in order to place us in closer touch with the construction field and to enable us to deliver to present and future users of our machinery the kind of service that has helped to build success for so many Besser plants.

"Our organization has been immeasurably strengthened by Harry S. Martin who for more than ten years was Vice-President in Charge of Sales for the United States Radiator Co. Mr. Martin becomes Secretary and Sales Manager of the Besser Sales Co., and brings to our organization a wealth of broad business experience which is placed at the service of our customers.

"Our organization is being further expanded so that in every state in the union there will be available a Besser man who is equipped by training and experience to advise you reliably about your production problems.

"Making concrete products automatically, at high speed and at consequent low labor cost, means profitable manufacturing. Any Besser man can tell you how this can be done in your plant and we are organized now so that the help of the Besser Sales Co., backed by the plant at Alpena (which is the largest concrete machinery products plant in the world), is always at your command."

The Madison Cement Stone Silo Co., Badger Annex, Madison, Wis., recently incorporated with a capital of $125,000, have branch factories at Boscobel, Wis., V. C. Paschal and W. W. Watt, managers; Sparta, Wis., W. W. Gurney and B. F. Gurney, managers; Waupaca, Wis., Wm. Kneeland and A. E. Woody, managers; Chippewa Falls, Wis., M. N. Hein and J. A. Jack, managers; Winona, Minn., E. P. De Voe, manager.

Economical uses of concrete in home construction will be taken up at the Home Builder's conference, to be held this month in Davenport, Iowa. This conference, which is one of a series of twenty-five being held in larger cities of the United States, is sponsored by the Quad-City Concrete Products association of Davenport, Rock Island, and Moline, Ill.

Object of the conference is to explain the ways in which concrete blocks, building tile, brick and other products may be employed in buildings, especially residences, and why it is advantageous to use concrete.

The association contends that, because of the unusually high costs of freight transportation, it is economical to use a product which does not need to be transported. They call attention to the presence of sand and gravel in this vicinity and say that 80 per cent of the material used in cement construction is found around the tri cities.

Sessions of the conference on the first day are particularly for manufacturers of concrete products. Proper methods for various phases of manufacture will be explained, and tests will be made to show the efficacy of these directions.

The second day sessions of the conference will be for home builders. Designing and construction of concrete houses will be set forth, and a section of a dwelling house wall will be constructed of concrete during the afternoon. Lectures will be given on the preparation, composition and use of cement mortar; plastering and lathing; composition and application of stucco.

The Quad-City association invites all architects, contractors, real estate men and prospective home builders to attend the conferences.

The Concrete Products Co., 1429 22nd street, Milwaukee, Wis., are in full blast at their factory at Thiensville, Wis., where they have a Dunn machine in operation making building tile, 6x6x12 and 8x8x12 inch sizes which is just the thing for back walls, partitions, etc. No lath required. Plaster right on the corrugated facing. One eight inch building tile is equal to nine brick and one man can lay over 500 per day, producing a wall equal to 4,500 brick, with a further saving of no less than one half the amount of mortar used in a brick wall, writes A. G. Meixner, president, who also declares the blocks are easy to handle. The company also manufacturers concrete drain tile on the same Dunn machine. They have decided to double their capacity by installing a larger tile machine to make up to 30 inches in diameter. Additional steam curing rooms, which gives a space of over 500 ft. in length is being installed. Rotary and shaker screening devices are also being installed for separating their aggregate.

A. W. Hand & Son, Lyon, Wis., have just completed a new concrete tile factory building for making concrete products. The new Besser equipment will make drain tile, building tile, building blocks and brick. Lift trucks will be used with self-racking pallets for carrying green products from machine to four steam curing tunnels, 7 ft. wide by 50 ft. long.

Dexter-Geare Corporation, Miami, Fla., a new organization, capital $100,000, are building a modern concrete products factory, having purchased a Federal building tile machine, Helm brick and block press, Hansen Champion roofing tile machine. R. E. Geare, vice-president and manager was formerly sales manager. T. L. Smith & Co., mixer manufacturers, Milwaukee, Wis.

A BIG DEMAND FOR THESE VAULTS
—PROFITS LARGE—

With our Adjustable Steel Molds you can easily make any size of the Automatic Sealing Burial Vault at an exceedingly low total cost.

When once they are seen and used in a community the Automatic Sealing Burial Vaults come into instant demand. They are far superior in every way to any other cement or steel vaults.

The manufacturing of these Automatic Sealing Burial Vaults with our Adjustable Steel Molds is a big money making opportunity. The first ten vaults you sell will more than pay back your entire investment—materials, molds, time, etc., etc.

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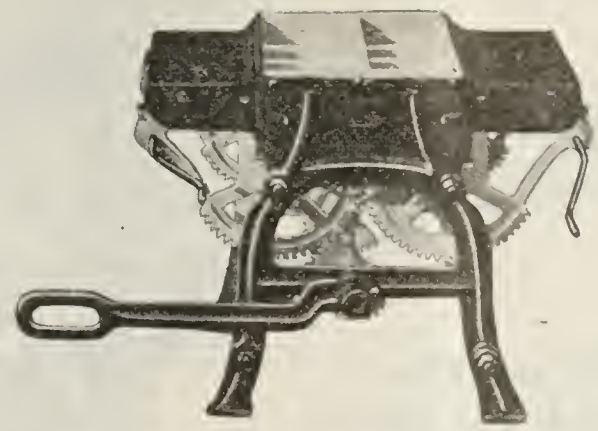

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Now is the time to increase the capacity of your block plant—turn out the maximum number of wall feet per day, while the demand for building materials is at its highest.

Block Output

Our Double-Speed Block Machine makes in each operation: 2 hollow blocks, 2 silo blocks, 2 solid blocks, 2 slabs, 4 half blocks, 2 water table slabs, 2 return ends, 2 chimney blocks, or 2 porch pier blocks.

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Double-Speed Brick Machine makes 16 brick at each operation, 8 brick being delivered at each side of the machine.

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This power tamper gives our block machine a capacity of 1,500 blocks per day and speeds the brick machine up to 15,000 brick per day. Roller-cut-off removes surplus material from mold box and finishes the top of the product. The block and brick are tamped rapidly and vigorously, resulting in a dense, strong product. Machine consumes little power and is practically fool-proof.

Write for block and brick machinery catalog, Dept. A,

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are lined with high grade fire brick furnished by The Davis Fire Brick Company.

We devote a special department to the manufacture of brick particularly adapted both physically and chemically to cement kiln construction. Large stock carried. Prompt shipments made.

Write for quotations on standard and special shapes.

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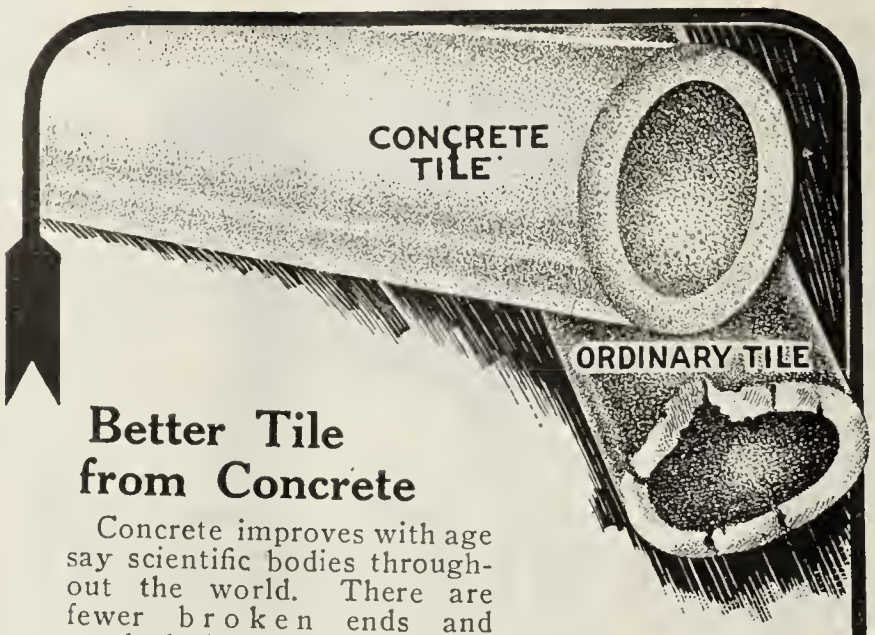

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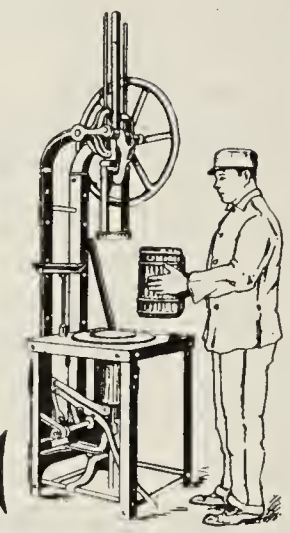
The Bureau of Standard has shown that the tamping method, that principle employed in the Cardiff, is superior to the rotary or pressing method of moulding.

Cardiff Cement Tile Machine

will make its owner from $50 to $100 per week. Cement tile, moulded in a Cardiff Machine make a profitable side line for anyone in a position to follow it.



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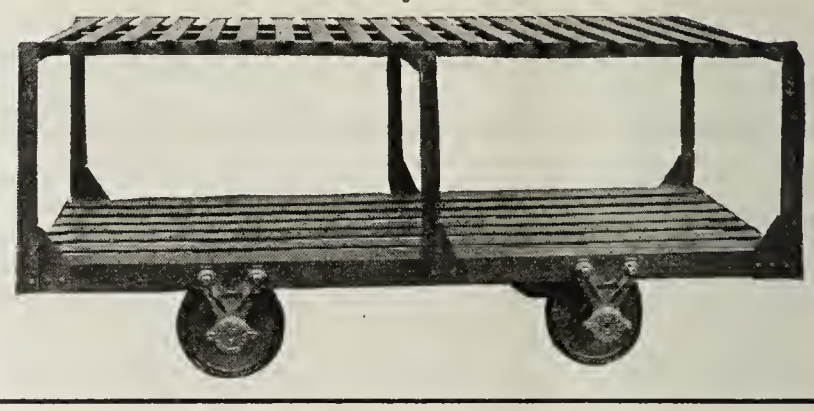

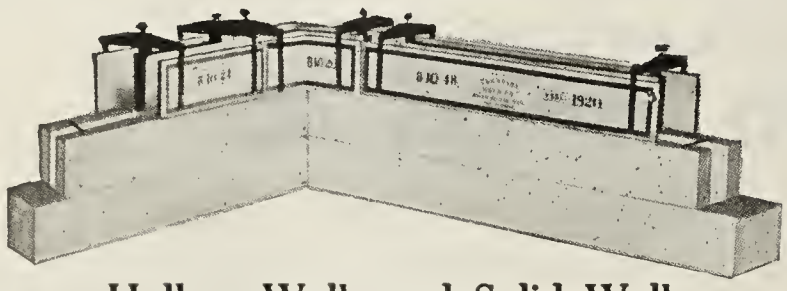

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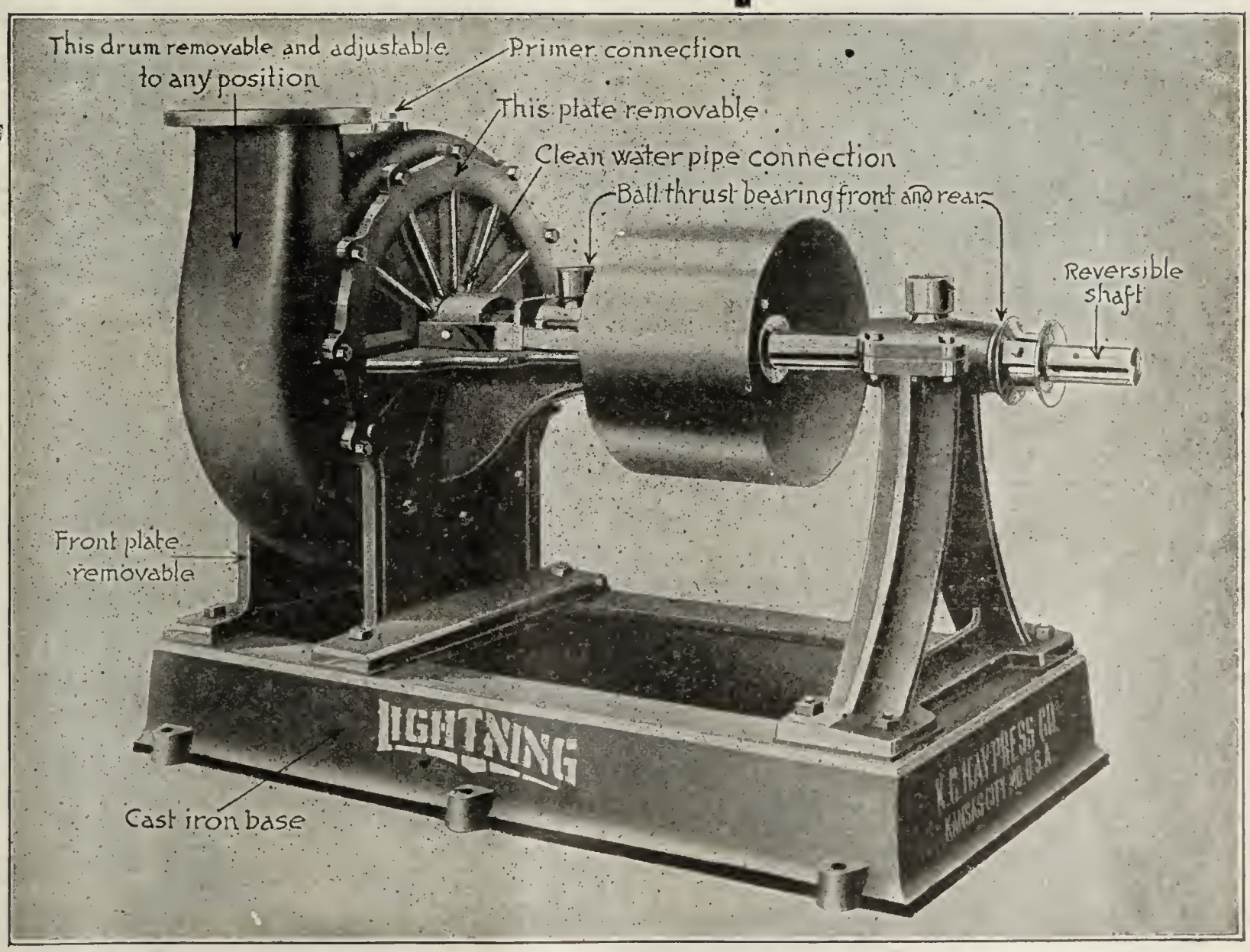

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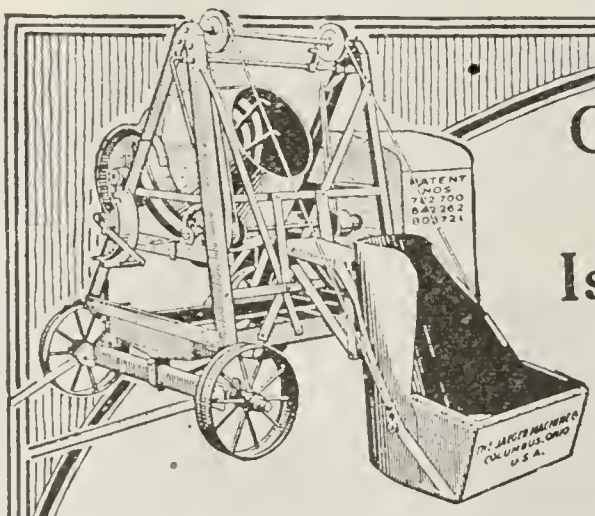

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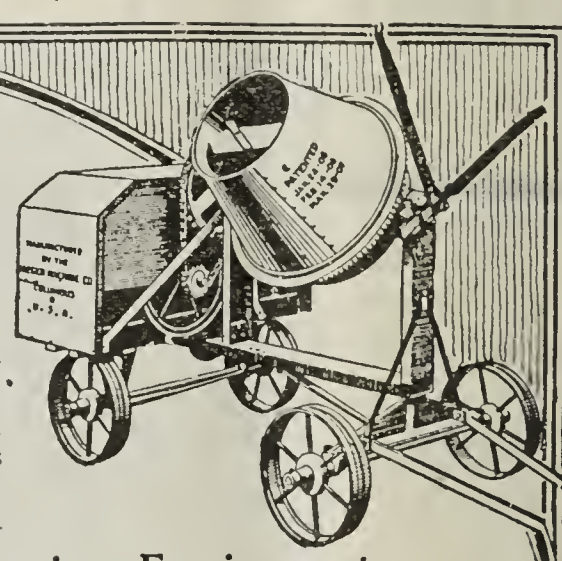

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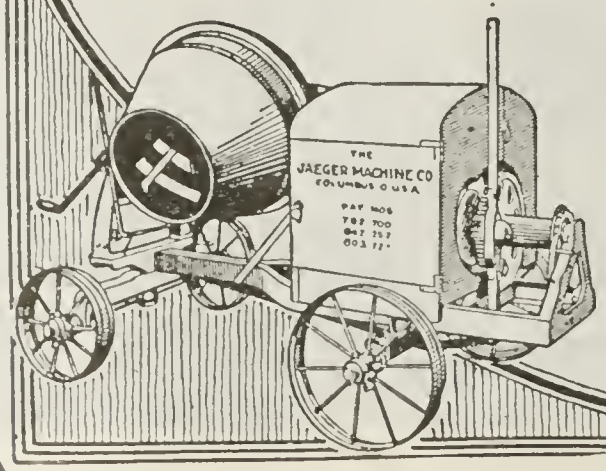

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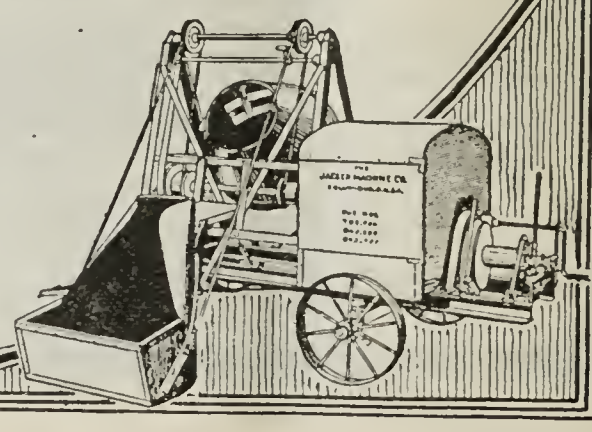
Mixers



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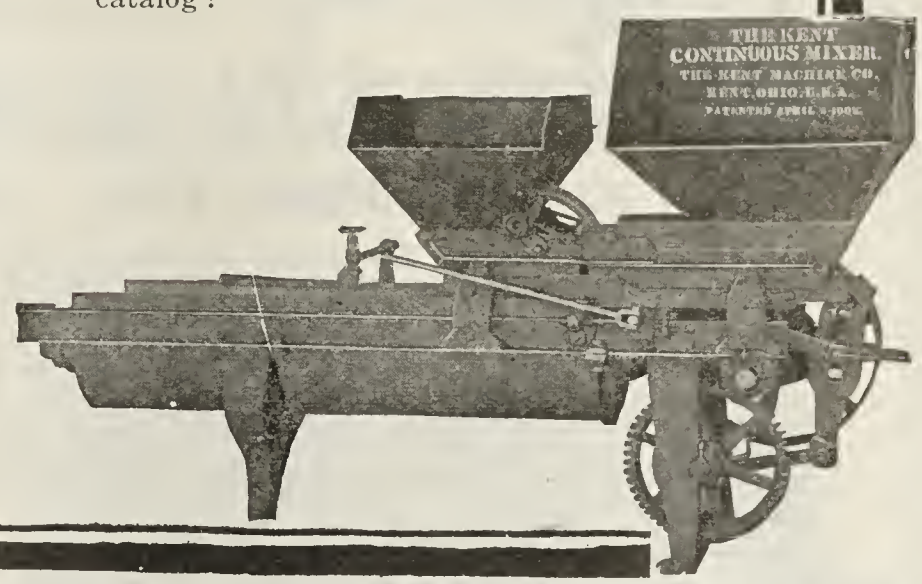
THE CHOICE OF THE WELL INFORMED

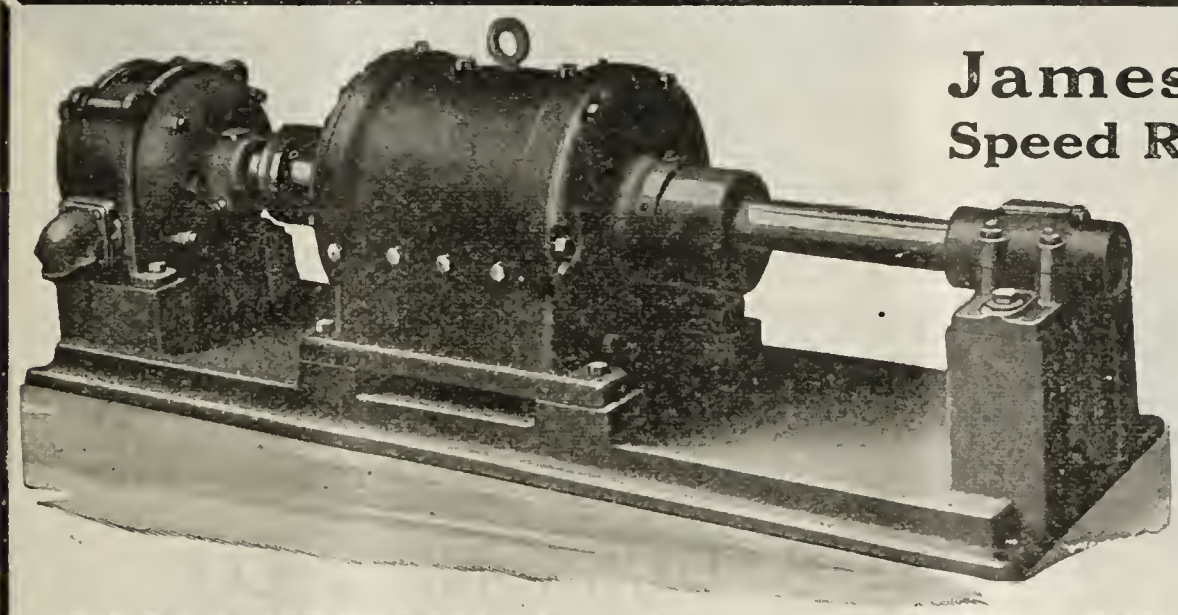
THE KENT CONTINUOUS MIXER

We claim—and conservatively—that the Kent Mixer has embodied in its design and construction more real points of superiority than any other mixer made for concrete products factories.

Some of the outstanding features are: Correct and proper proportioning of aggregates; continuous in operation; time and labor saver; especially designed for concrete products plants; does its own measuring, proportioning, mixing, watering and discharging accurately; operates entirely by itself; does away with the cumbersome hoisting cars, charging platforms, chains, cables and what not on many of the old-fashioned batch mixers, etc., etc.

To fully explain these and many other points of superiority—may we send you a catalog?





James All Spur Gear
Speed Reducing Transmissions

Entire gearing encased. No dirt or dust can reach the working parts, and runs in oil. Built in a variety of sizes and speed ratios from 4:1 to 1600:1 or more—½ H.P. to 100 H.P.
Send for our latest bulletin, No. 7.

D. O. JAMES MFG. CO.

1124 West Monroe Street

Chicago, Ill. U. S. A.

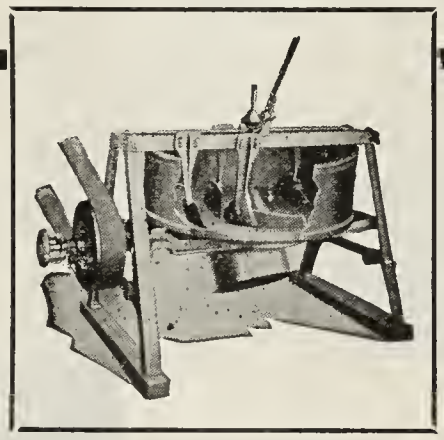
An all-round mixer for all-the-year-round work. Use it on all your concrete, mortar and plaster mixing jobs.

CONTRACTORS USE THIS MIXER ON THREE TIMES AS MANY JOBS

Portable Dunn Shovel Mixers are designed to mix mortar and plaster as well as eonerete. They are built to do this work better than you ever had it done before. We want you to expeet more service from it than from any other mixer. Don't be afraid of overworking it; keep it busy day after day on all of your mixing jobs. Even if you give it three times as mueh work to do as you would an ordinary mixer, it won't wear out any sooner.

You'll like the ease by which this mixer is eharged, its rapid and convenient bottom discharge, the way it cleans itself, its compactness, portability, sturdiness and dependability. Because it will mix concrete, mortar and plaster and because of its many features, you really get three mixers for the priee of one. And you pay no more for it than for an ordinary mixer. Try it out for a couple of weeks before you buy.

Ask Us to Send You Bulletin T-20



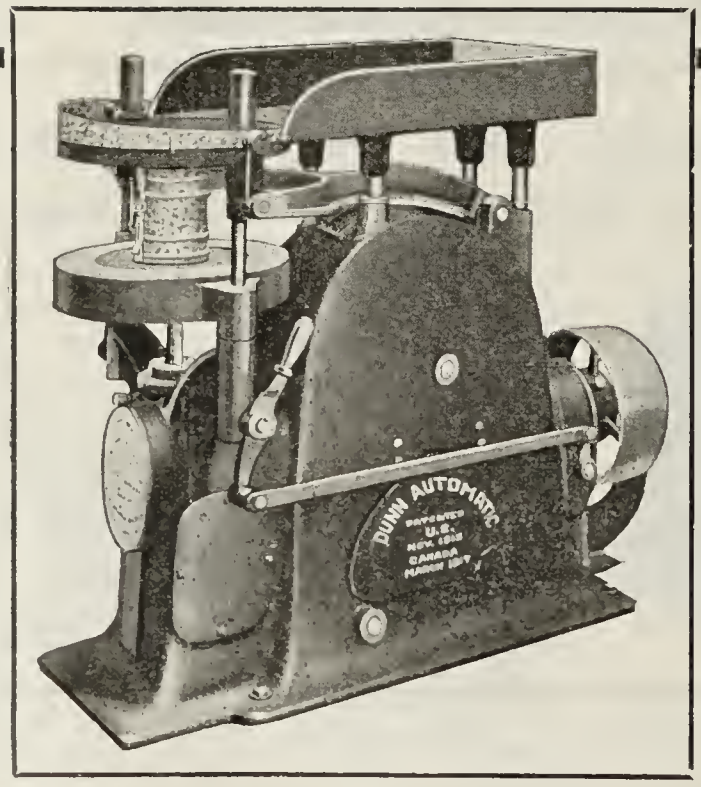
The Dunn Shovel Mixer produces a thoroughly mixed, plastic material because of its four shovels. A hundred times a minute the material is shoveled, stirred and troweled.

It not only saves the labor of one man, but it improves the quality of your products and increases your production. You may try it out before buying.

RUN YOUR PRODUCTS PLANT WITH ONE MAN LESS

With a stationary Dunn Shovel Mixer properly installed you ean improve the quality of your products and increase your production with one man less than you are now employing. Simply because power and gravity are utilized to accomplish automatically what you are now doing by hand. The only labor involved in keeping your produetion machines, whatever they might be, constantly supplied with material is in loading a bucket below the floor level with the unmixed materials.

You'll be interested in knowing that the cost of this eomplete mixing and eonveying equipment is less than that of the ordinary eonveyor alone.



Write for Bulletin M-21

THE BUSINESS OF MAKING HOLLOW TILE

The immense demand and market for a more economical, more permanent building unit, such as hollow conerete tile, is readily evident in every community. Supplying this market means a permanent business bringing in large earnings.

It is a big part of our business to completely equip standardized plants for turning out this hollow tile and other produets in large quantities at low cost. That we are able to estaïblish you in a most profitable business is demonstrated by the success enjoyed by all Dunn Plant owners.

There's a whole lot to be said about this proposition which will interest you. Drop us a line for partieulars.

W. E. DUNN MFG. CO.

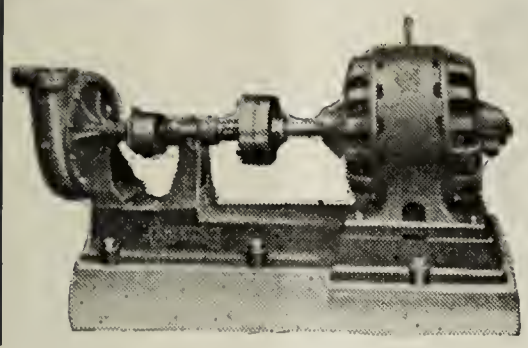
414 W. 24th Street

HOLLAND, MICHIGAN

AMERICAN

TRADE MARK REG'D. U.S. PAT. OFFICE

PUMPS



Built to Meet All Possible Power Plant Requirements

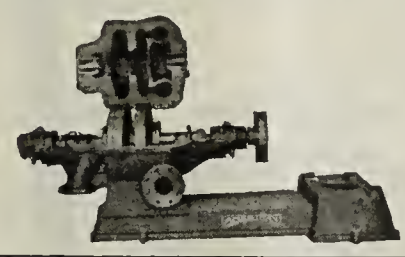
Fifty standard types of centrifugal pumps regularly built and special designs as wanted.

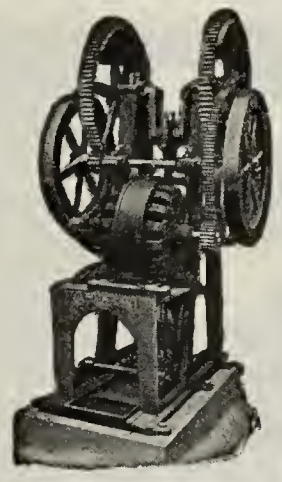
Also a complete line of deep well plunger pumps.

Write for Catalogs.

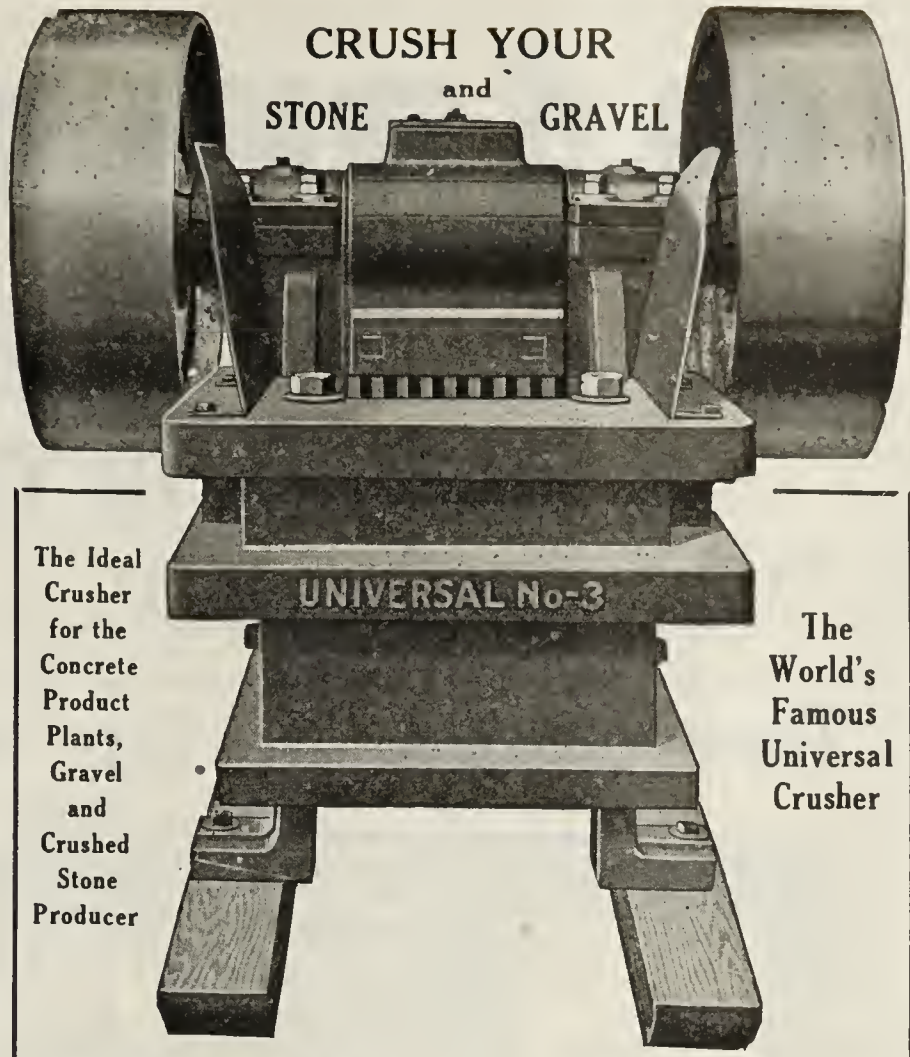
The American Well Works

General Offices and Works: Aurora, Ill.
Chicago Office: First National Bank Bldg.





CRUSH YOUR STONE and GRAVEL



The Ideal Crusher for the Concrete Product Plants, Gravel and Crushed Stone Producer

The World's Famous Universal Crusher

We Build Crushers from 5 Tons to 300 Tons per 10-hour Capacity

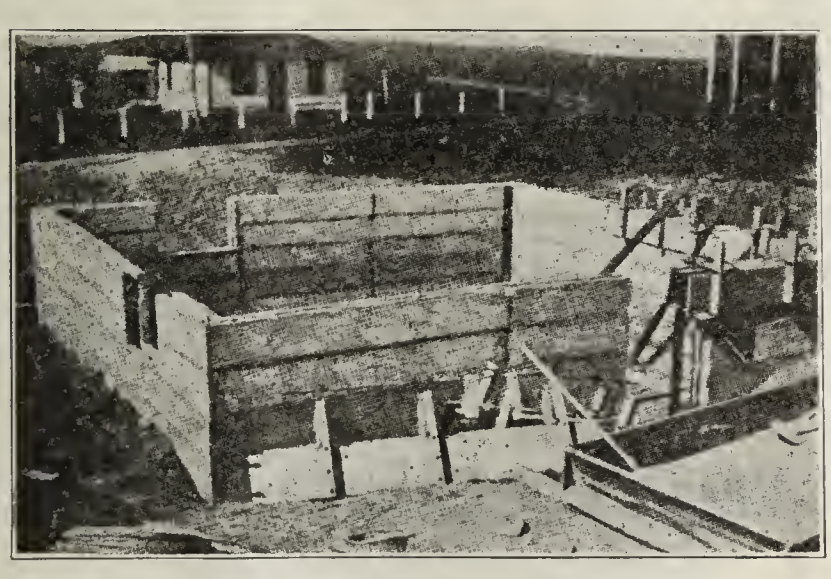
Instantly adjusted to produce size required from ¼ inch to 3 inches. *Write for Folder No.* 14.

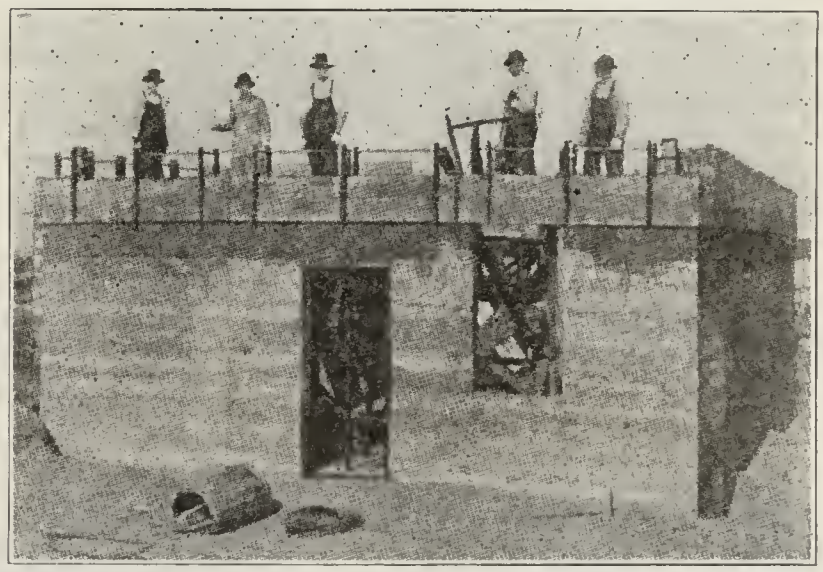
UNIVERSAL CRUSHER COMPANY

230 Bee Ave. Cedar Rapids, Iowa, U. S. A.

FROST HOLLOW WALL FORMS

ADJUSTABLE TO ANY KIND OR SIZE OF BUILDING





With our forms you can build a double wall, reinforced concrete building to compete with the cost of frame construction.

Moisture-proof, fire-proof, repair-proof walls. Save paint, lath, time and labor to you. Save repair, fuel and insurance to the owner.

Forms adaptable to any size building, adjustable to any thickness wall. Built of poured concrete, reinforced three ways with continuous dead air space makes the most desirable method of building construction. Simple to use, easily adjustable. No skilled labor required. Method has been tried and proven.

Write for complete description of method and its operation, photos showing work done, and costs.

HOLLOW CONCRETE WALL CO.

H. T. FROST, PRESIDENT MITCHELL, SOUTH DAKOTA

MARBLE CHIPS

At Wholesale

R. V. REYNOLDS CO.

1415 Railway Exchange : : Chicago, Ill.

These Booklets Are Easy to Read and Worth Reading

Pamphlet No. 15
gives details of the various types of dragline cableway excavator installations suitable for general dirt-moving operations, brick and tile plants, and so forth.

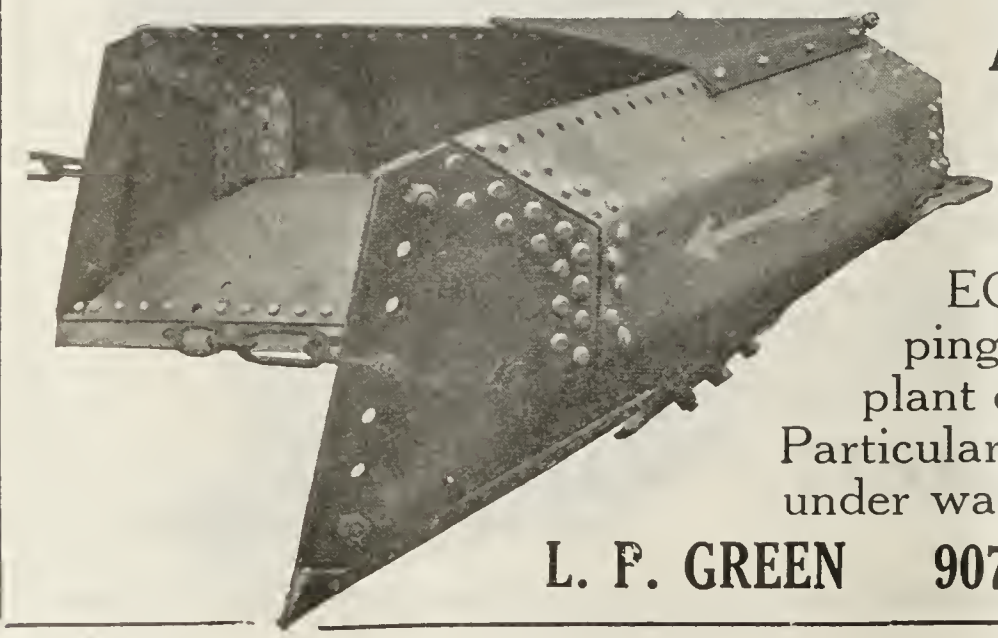
Pamphlet No. 14
is a handy compilation of data on the dragline cableway excavator method of excavating and conveying sand and gravel, illustrated with many views of typical installations.

Pamphlet No. 12
describes the latest developments in the use of mechanical drag scrapers for handling gravel from hillside, and explains the adaptability of power scrapers for small pits.

Pamphlet No. 11
illustrates practical solutions of various storage problems by use of scrapers and dragline cableways, some of this information being now published for the first time.

Which of the above pamphlets do you want? Send in your request at once.

SAUERMAN BROS. 1139 Monadnock Bldg., CHICAGO



ARROW POWER DRAG SCRAPER

A Real Earth Mover

Operated by two drum hoist. It will do excavating work of all kinds ECONOMICALLY. Grading—Stripping—Delivery of material from pit to plant or bins or for wagon or truck loading. Particularly adapted to hillside deposits or under water. Write for catalog.

L. F. GREEN 907 Lumber Exchange Bldg. Chicago

Big Profits Making Septic Tanks
BENEFIT BY OUR EXPERIENCE

After years of successful operation of a Concrete Products Plant, we have experienced in the last six months, the dullest time in its history in the sale of blocks, brick, stave silos and burial vaults. During this time the sale of our Unit System Septic Tanks has increased beyond all expectations. We are shipping them out in single shipments, and car lots, and we are four weeks behind our orders. We sell to the plumbing trade and plumbing jobbers and in some localities we have agents selling directly to the farmer and the village house-holder.

Every family who is not situated on a sewer is a prospective customer.

The profitable shipping distance is a radius of about two hundred miles from our plant, and we have decided to offer for sale to other concrete products plants the forms to manufacture Unit System Septic Tanks.

The limitations of this new business are boundless. A sewing machine agent considers two or three sales a week good business, but one of our salesmen sold eighteen installations of our septic tanks three weeks ago last Saturday, in the little village of Erie, Ill., with practically the same profit for each installation as is made on the sale of a sewing machine.

You have little or no competition in your territory. Septic tanks are sold every month in the year. Our customers are community high schools, public schools, offices, stores, churches, hotels, dwelling houses, industrial plants, etc.

Business is good with us. Let us pass these conditions on to you.

For Full Particulars Write

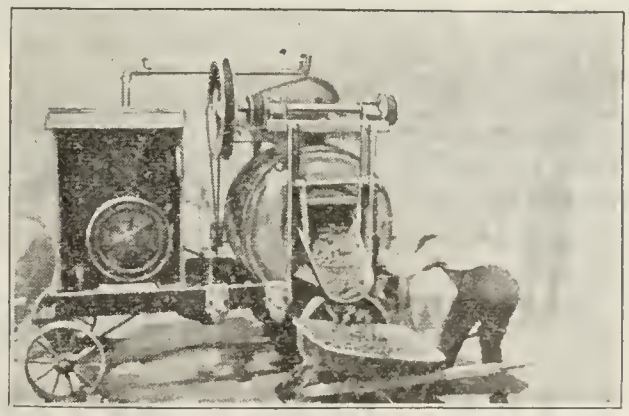
WM. DE LHORBE **Oregon, Ills.**

Concrete Blocks, Bricks Building Trim, Posts, Ornamental Work, Etc.
WHEN FACED WITH
Mica Spar Crystals

IS CHANGED INTO
SPARKLING GRANITE
Beautiful, Artistic and Everlasting

Made in six scientifically milled sizes, extremely hard, sharp and free from dust. Insures strength and beauty. Booklet "Micaspar and How to Use It," with free samples mailed on request.

Crown Point Spar Company, Inc.
101 PARK AVE. NEW YORK



THE *Atlas* MIXER

Represents the best established practice in Concrete Mixer Construction.

Its dependability and simplicity commends it to the contractor who appreciates the importance of uninterrupted service.

The Atlas is made in various sizes and styles. Let us mail you our catalogue.

Send for it today—NOW

ATLAS ENGINEERING CO.
3023 Lisbon Ave. **Milwaukee, Wis.**

P. S.—If you are interested in material handling equipment, let us mail you our ATLAS Wagon Loader, Box Car Loader, Car Unloader, Belt and Bucket Conveyor and Portable Storage Bin catalogue. The catalogue is yours, simply ask for it.

WATER

WE-FU-GO AND SCAIFE

PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

BELTING

"V-B" Balata
"AMPERE"
(Canvas Stitched)
GRIP-ON
(Impregnated Solid Woven)

Write for Prices, Discounts and Samples

VICTOR BALATA & TEXTILE BELTING CO.

Factory: Easton, Pa. Main Office: 38 Murry St., New York
Stores: 167 N. Market St., Chicago and 85 Purchase St., Boston

CONVEYOR BELTS A SPECIALTY

THE HELM PRESS

has contributed to the building industry the greatest advance toward a perfect, permanent brick and block. Every part of it has culminated from mature experience and is based on sound engineering principles. The Helm press is always built upon the basis of ultimate satisfaction to the user. No pains are spared to use the best materials obtainable and the best workmanship in putting them together.

That is why hundreds of satisfied users employ the Helm press to make their bricks and blocks and why a large percentage of our business is repeat orders.

Helm supplies everything necessary for the complete concrete brick and block factory—plans and installs it—then stands solely responsible for its satisfactory operations. If you are considering installing a new brick or block plant, or changing your present equipment, you are invited to write us—it obligates you not at all and you can't go wrong.

THE PRESS THAT MAKES THE MONEY

THE HELM BRICK MACHINE CO.

764 MITCHELL STREET CADILLAC, MICH.

For FIRE BRICK and DUST

Specify

CRESCENT QUALITY

THE UTMOST IN
FIRE CLAYS

CRESCENT REFRACTORIES CO.

Curwensville, Clearfield Co., Pa.

MIXER

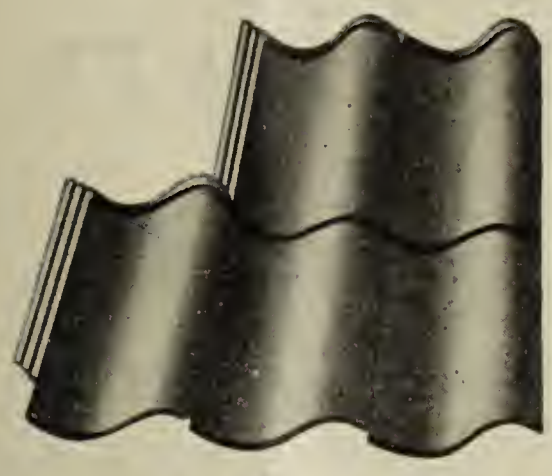
For Quick Sale

½-yard Smith Tilting Mixer, on trucks, 8 hp. Steam Engine, 10 hp. Boiler, equipped with Auxiliary Hoisting Drum of 2,000 lbs. capacity.

F. O. B. Milwaukee, Wis. . . . $1,000.00

Boehck-Lowe Machinery Co.

71 West Water St. Milwaukee, Wis.



SPANISH TILE

The U. S. Champion Tile

Is a perfect and everlasting concrete roofing of artistic beauty in any color desired. Easily made and applied by anyone.

Our newly improved and patented tile machines are provided with a new device that makes automatically interlocks on both ends and sides of our tiles—an accomplishment of immense value for the roofing tile problem and characteristic for our tiles only.

Buy the U. S. CHAMPION TILE MACHINES for making FRENCH or SPANISH TILE. They help progressive builders and concrete products manufacturer cutting down the high building material costs besides giving large returns from a small investment.

Write for description and prices.

L. HANSEN CO.

3617 East 23rd St. Kansas City, Mo.

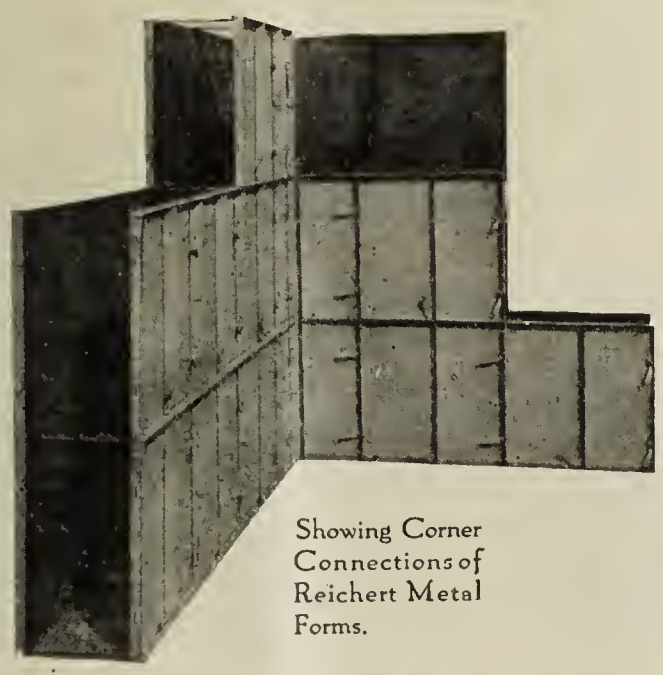
FRENCH TILE

Better Work in Less Time

REICHERT Adjustable Steel Molds will enable you to do better work on Walls and Foundations. Their perfect alignment and close connection guarantees a SMOOTH SURFACE over the entire area of the job.

REICHERT Adjustable Steel Molds will save you valuable time. The Improved Locking Device operates easily, no hammering necessary. Unskilled labor, with brief instruction, can assemble and operate with perfect results.

REICHERT ADJUSTABLE STEEL MOLDS



Showing Corner Connections of Reichert Metal Forms.

are standardized, all parts interchangeable, and PERMANENT. One set of Forms will enable you to SAVE TIME AND MONEY on a wide range of jobs, FOR MANY YEARS.

With REICHERT Adjustable Steel Molds in use, you can bid lower on contracts, beat competition, and still maintain the same margin of profit—or actually increase it.

GET THE FACTS. Write us for catalog and full information.

Reichert Metal Concrete Forms Company

1188 Weil Street, Milwaukee, Wisconsin

THE POLK SYSTEM

All-Steel Machines for All Kinds of

Circular Concrete Construction

We contract grain storages.

Polk Genung Polk Company

521 Occidental Bldg. Indianapolis, Ind.

Fort Branch, INDIANA

Henry Heil Chemical Company

210 to 214 South Fourth Street, ST. LOUIS, MO.

We make a specialty of supplying cement works with

Chemical Apparatus, Chemicals and Reagents

Gilmore's Needles, Cement Moulds, Vicat Apparatus, Schumann's, LeChatelier's and Jackson's Specific Gravity Apparatus, Etc.

Pyrometers, Calorimeters

High Grade Goods Only

Satisfaction Guaranteed

Sand Lime Brick Machinery

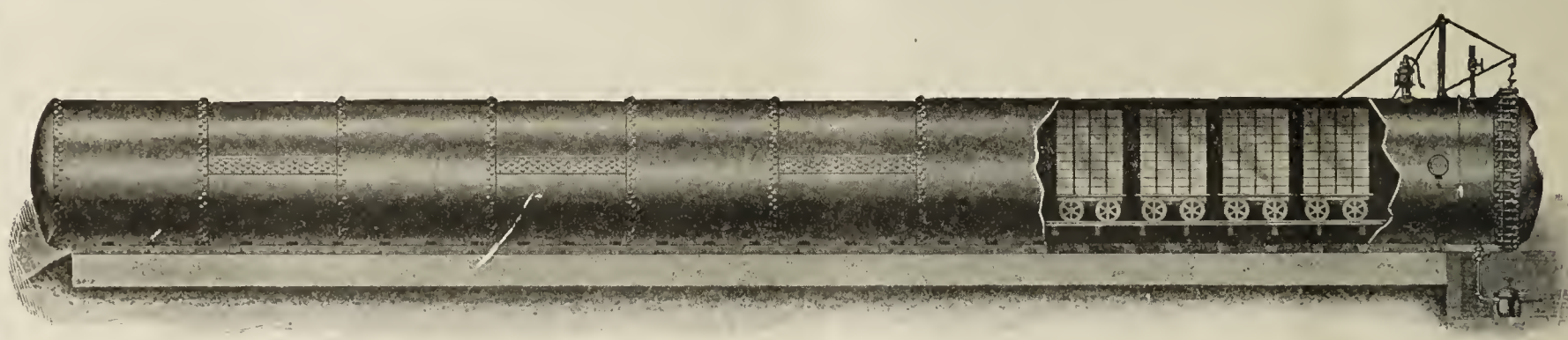
Our complete line of Sand Lime Brick Machinery makes it possible to secure just that machinery which is required to make your plant a success. We favor no particular type of machinery but are guided by the needs of the customer. Our wet and dry grinding mills have transformed a number of unsuccessful plants into dividend producers, while our Presses, Mixers, Hardening Cylinders and other equipment are of equal quality. We can exactly meet the demands of any manufacturer with a quality of machinery which will operate at a profit with a minimum amount of attention and expense.

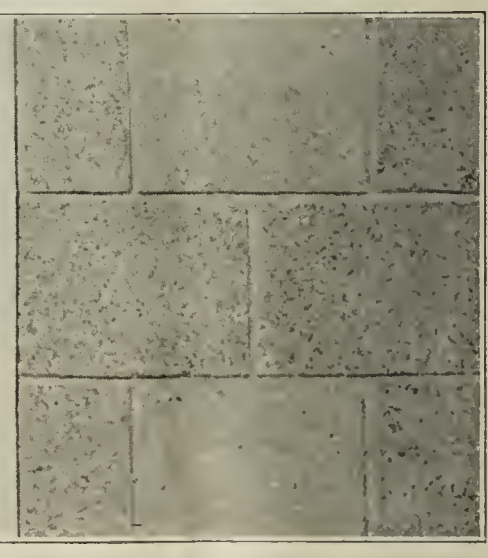
Correspondence solicited

The Hadfield-Pen field Steel Co.,

WILLOUGHBY, OHIO

Formerly The American Clay Machinery Co.





Building Material of Beauty

Minimum absorption, maximum strength, light and easy to lay and produced in style, shape and design to meet any architectural requirements.

INEXPENSIVE **PERMANENT** **POPULAR**

Under one operation the stone are veneered with granite, marble or other natural products and sprayed as they come from the machine, producing a Reconstructed Stone in natures own beauty.

AN OPPORTUNITY

If you are interested in producing a high class building unit of standardized dimension, and desire to invest in a Real Manufacturing Business, WRITE US NOW.

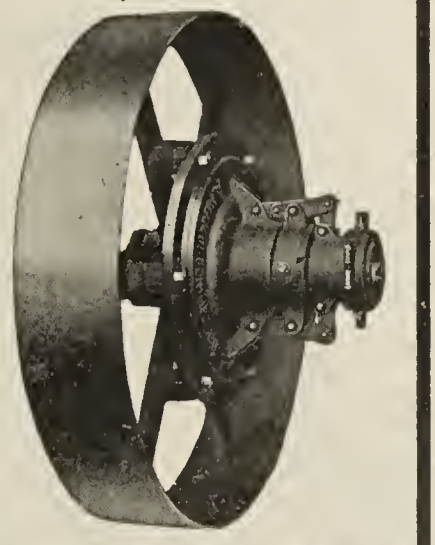
HYDRAULIC RAMMING CONCRETE STONE MACHINERY

LITTLE FALLS **NEW JERSEY**

LITTLE DAILY LEAKS OF POWER BOOST YOUR COAL BILL

The High Cost of Power Is Reduced to a Minimum By the Use of a

Plamondon Disc Type Friction Clutch



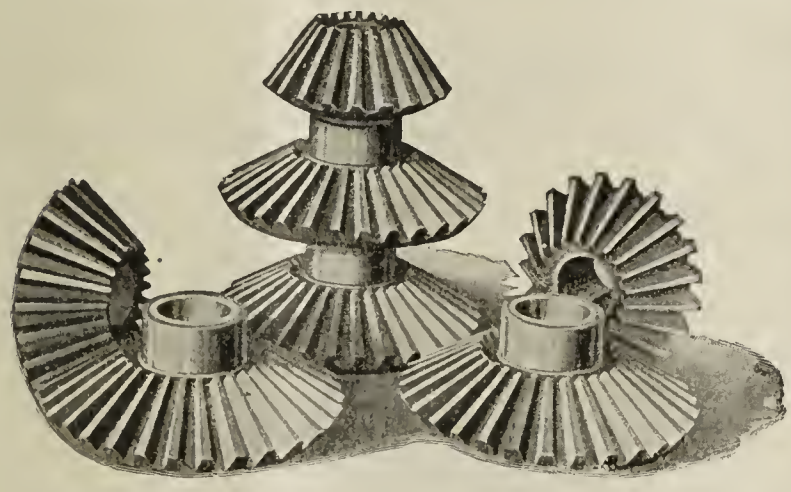
The power of this clutch is unusual. The double toggles on this clutch develop such tremendous pressure that even on the largest clutches only a hand lever is needed to engage or disengage the clutch. The geared devices usually needed to operate large clutches are unnecessary.

This is only one of the practical advantages the cement mills find in this clutch. Write for our new catalog No. 59 and learn the rest of them.

WE ALSO MANUFACTURE GEARS

A. Plamondon Mfg. Co.

5301 So. Western Blvd. CHICAGO, ILL.



Make Your Gear Service a Certainty

Ganschow Bevel Cut Gears—like Ganschow Gears of every kind—are cut with an accuracy and precision which makes smooth, easy, effective working a certainty. They minimize wear and tear and insure long life to the parts. From twenty to forty per cent less power is required to operate

Ganschow Cut Gears

as compared with cast gears, because of evenly-thick and evenly-spaced teeth, and because they are uniformly smooth. Throughout the whole machine the jar and strain are greatly reduced; and this means gear-efficiency from every standpoint.

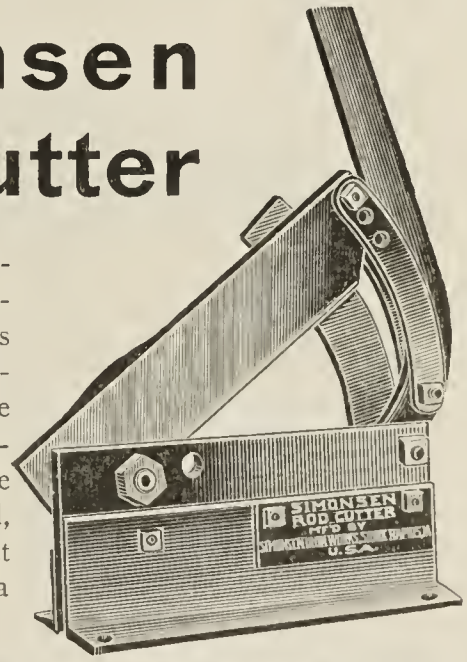
As specialists in gear work, our splendid facilities enable us to take care of any requirement from the smallest gear up to 12 ft. in diameter—and do it QUICK. Every gear strictly according to specifications and free from defects.

How about YOUR gear requirements?

Wm. Ganschow Company, Chicago, Ill.

1003 W. Washington Street

Simonsen Bar Cutter



Is designed especially to meet the requirements of builders in concrete construction needing a portable shear for cutting reinforcing bars on the job. It's a practical, low-priced shear that will pay for itself in a short time.

NON-BREAKABLE STEEL BODY

Cutting Jaws are of the "welded in" type, our own patented design. Lower or stationary jaw has a keen edge of hardened tool steel and is practically indestructible. Upper jaw does the actual cutting and is hinged at rear end on a heavy case hardened steel pin. It's reinforced.

Made in three sizes. No. 10 weight 75 lbs. Capacity ¾ in. round or ½ in. square twisted. No. 11 weight 125 lbs. Capacity 1 in. round or ¾ in. square twisted. No. 12, weight 175 lbs. Capacity 1¼ in. round or 1 in. square twisted. Shipped set up complete with suitable lever.

Ask your supply dealer or write us for full information.

SIMONSEN IRON WORKS, Manufacturers

Sioux Rapids Iowa, U. S. A.

For Better Concrete, Stronger Mortar—use HYDRATED LIME

Increases Concrete Density

By virtue of its ability to fill the voids, Hydrated Lime increases the density of concrete. The mass becomes more watertight—practically impervious to water. Honeycomb and other structural weakness are also prevented. Hydrated Lime promotes intimate contact of the concrete mass with the forms and produces smooth, pleasing exterior surfaces.

Other Reasons Why You Should Specify and Use Hydrated Lime

because

1. Makes the mixing of Portland cement concrete more easy, inasmuch as it lubricates the sand grains and coarse aggregates.
2. Renders the concrete mix plastic enough to flow freely and smoothly with a minimum of excess water.
3. Makes the concrete easier to work after it is deposited in the forms, thus eliminating labor usually required for spading and tamping against the forms.
4. Eliminates the tendency toward cracking, because it minimizes alternate expansion and contraction due to moisture changes.
5. Promotes uniformity of the mass concrete by producing a colloidal or jelly-like medium through which the rock and matrix do not segregate, thereby producing a stronger concrete.
6. Materially and directly increases the ultimate compressive strength and efficiency of the concrete, by virtue of its ability to hold water in mechanical suspension and thus supplying the necessary moisture required by Portland cement in order properly to set and attain its maximum strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

Ladd Lime & Stone Co., Cartersville, Ga.

Marblehead Lime Co., Chicago—Kansas City

Louisville Cement Co., Louisville, Ky.

Lee Lime Co., Lee, Mass.

White Marble Lime Co., Manistique, Mich.

Glencoe Lime & Cement Co., St. Louis, Mo.

Ste. Genevieve Lime Co., St. Louis, Mo.

Rockland&RockportLimeCorp. New York—Rockland, Maine—Boston

Hunkins-Willis Lime & Cement Co., St. Louis, Mo.

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

National Lime & Stone Co., Carey, Ohio

Ohio Hydrate & Supply Co., Woodville, Ohio

Woodville Lime Products Co., Toledo, Ohio

Merion Lime & Stone Co., Norristown, Pa.

American Lime & Stone Co., Tyrone, Pa.

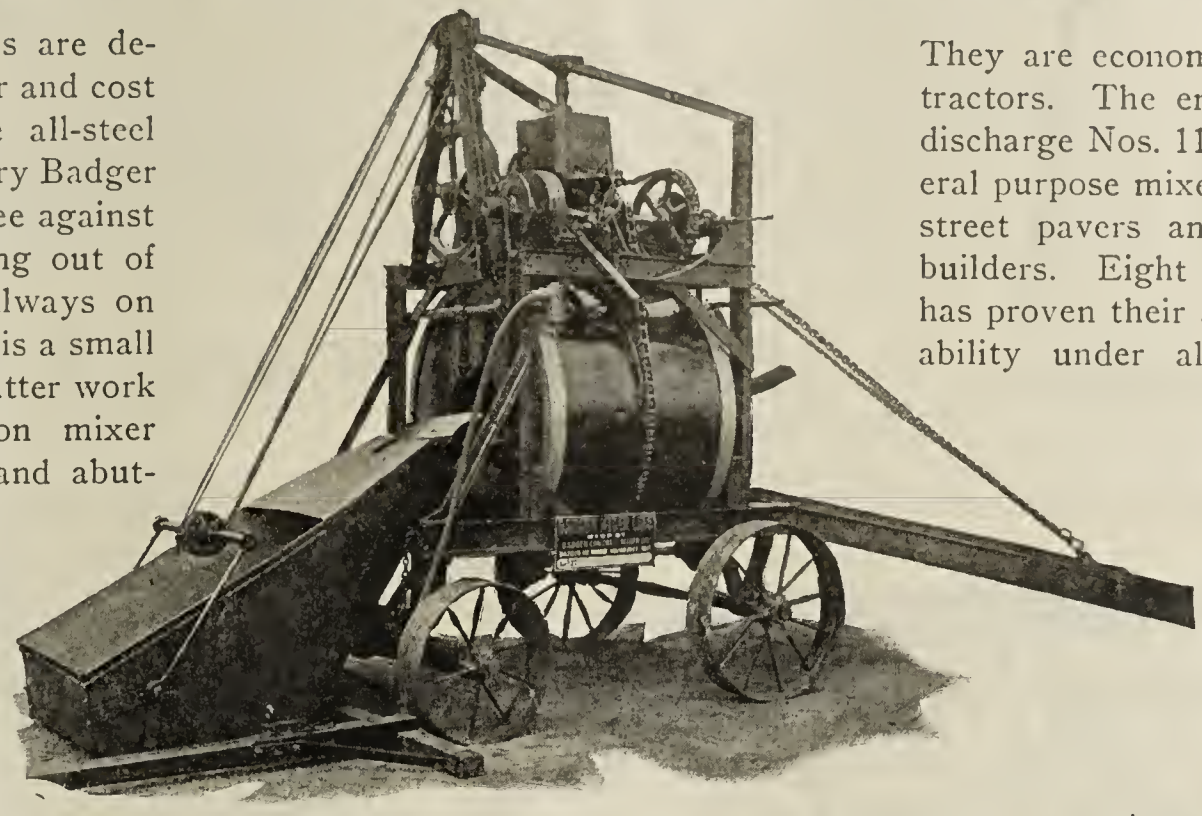
Riverton Lime Co., Riverton, Va.

Vermarco Lime Co., West Rutland, Vt.

Western Lime & Cement Co., Milwaukee, Wis.

BADGER MIXERS

The Badger Mixers are designed to save labor and cost of operation. The all-steel construction of every Badger Mixer is a guarantee against breakage or wearing out of parts. They are always on the job, whether it is a small mixer on curb or gutter work or the construction mixer upon foundations and abutments or the alley and street paver. Their light weight and durability has made a distinctive reputation for the Badger Mixer.

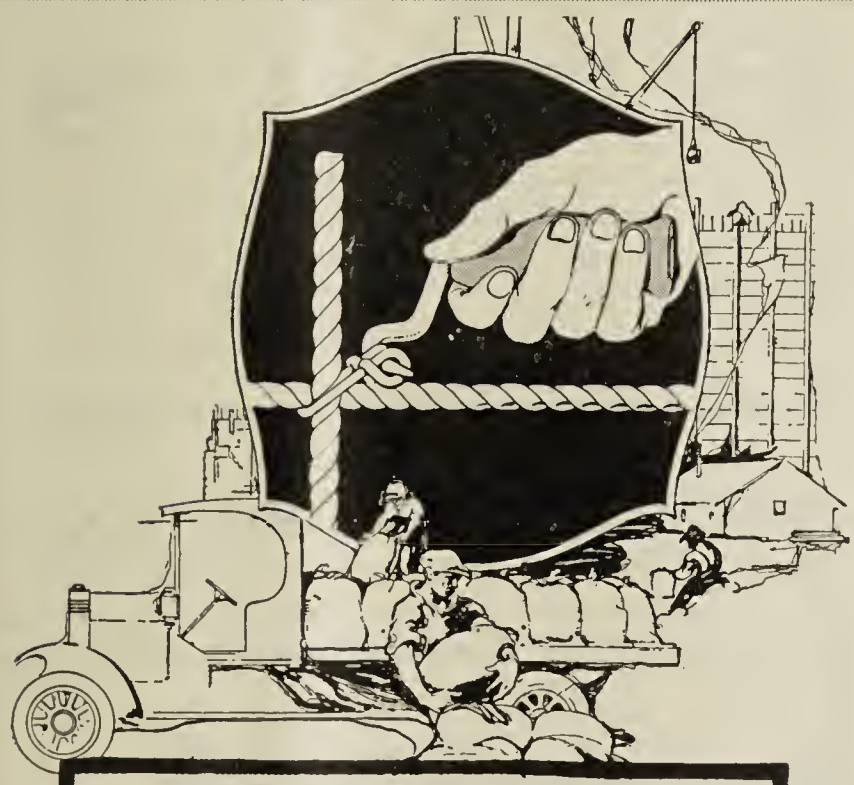


They are economical to the contractors. The end load and end discharge Nos. 11 and 15 are general purpose mixers and alley and street pavers and country road builders. Eight years of service has proven their absolute dependability under all conditions of concrete work.

Write for our attractive prices.

The ~ Badger ~ Mixer Line

BADGER CONCRETE MIXER CO., 13th Floor MAJESTIC BLDG. **MILWAUKEE, WIS.**



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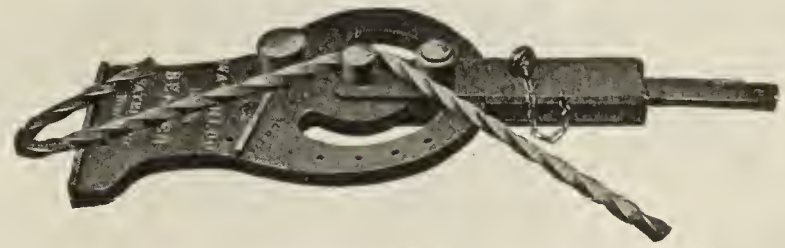

It's made in 2 sizes, and is guaranteed to bend bars as follows: No. 2 bends cold reinforcing bars including 1⅛ in. round or square. Price $30.00. No. 3 bends cold reinforcing bars including 1¼-in. round or square. Price $35.00.

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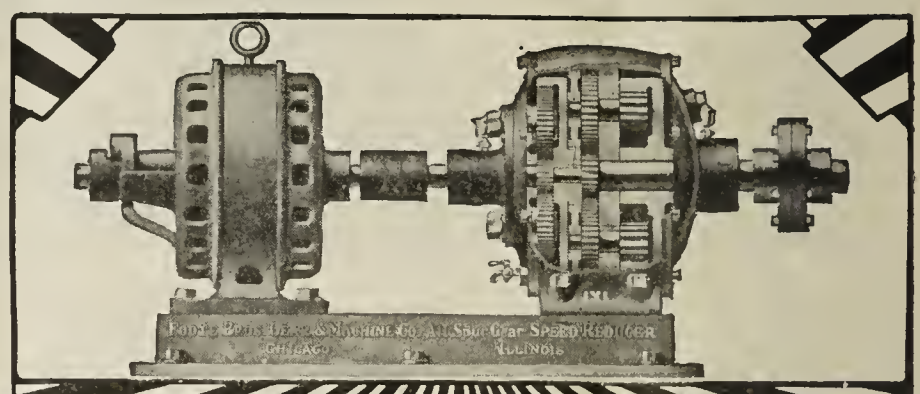

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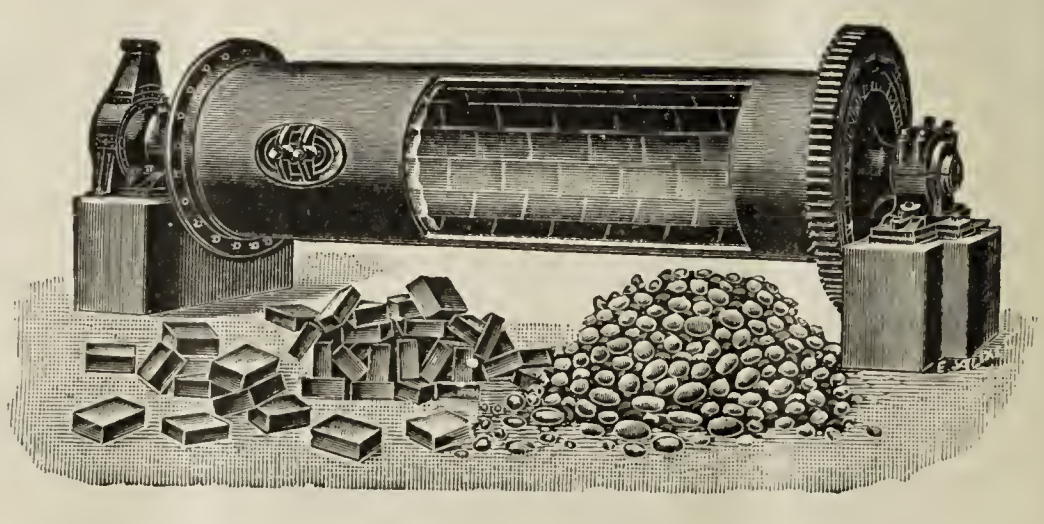

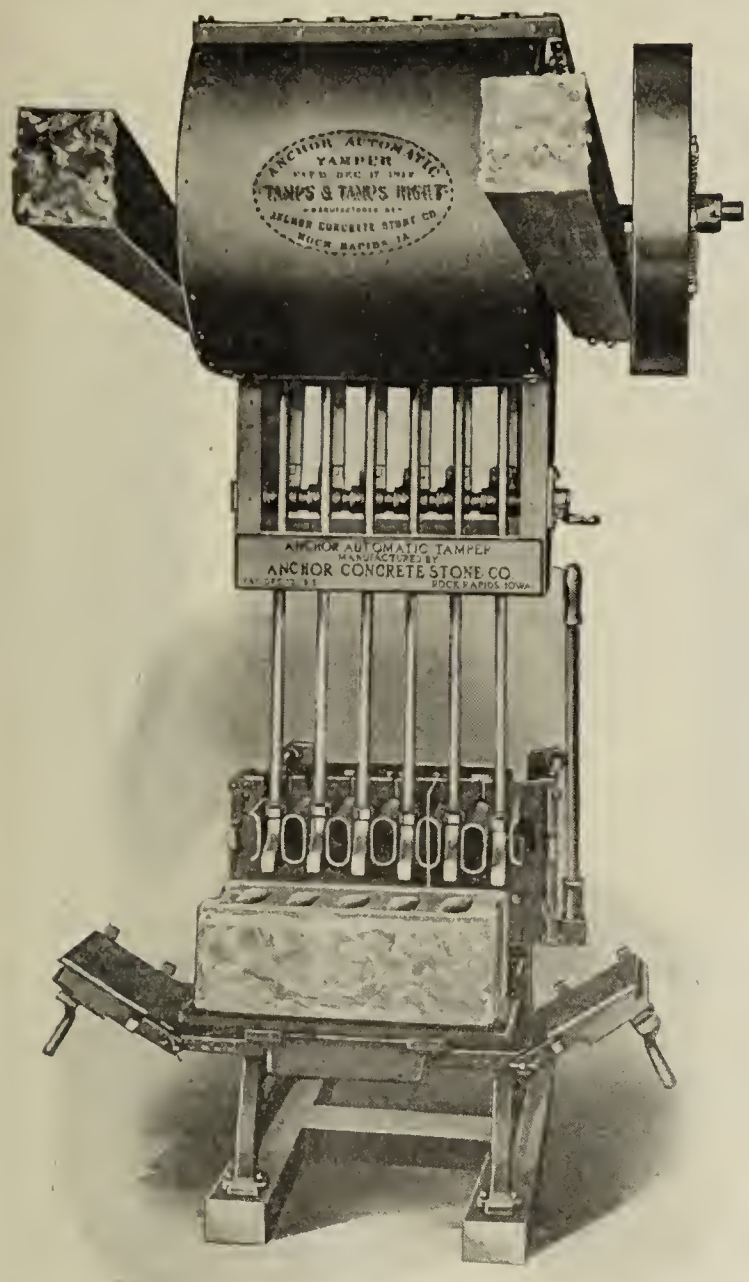

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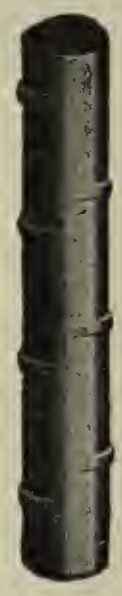

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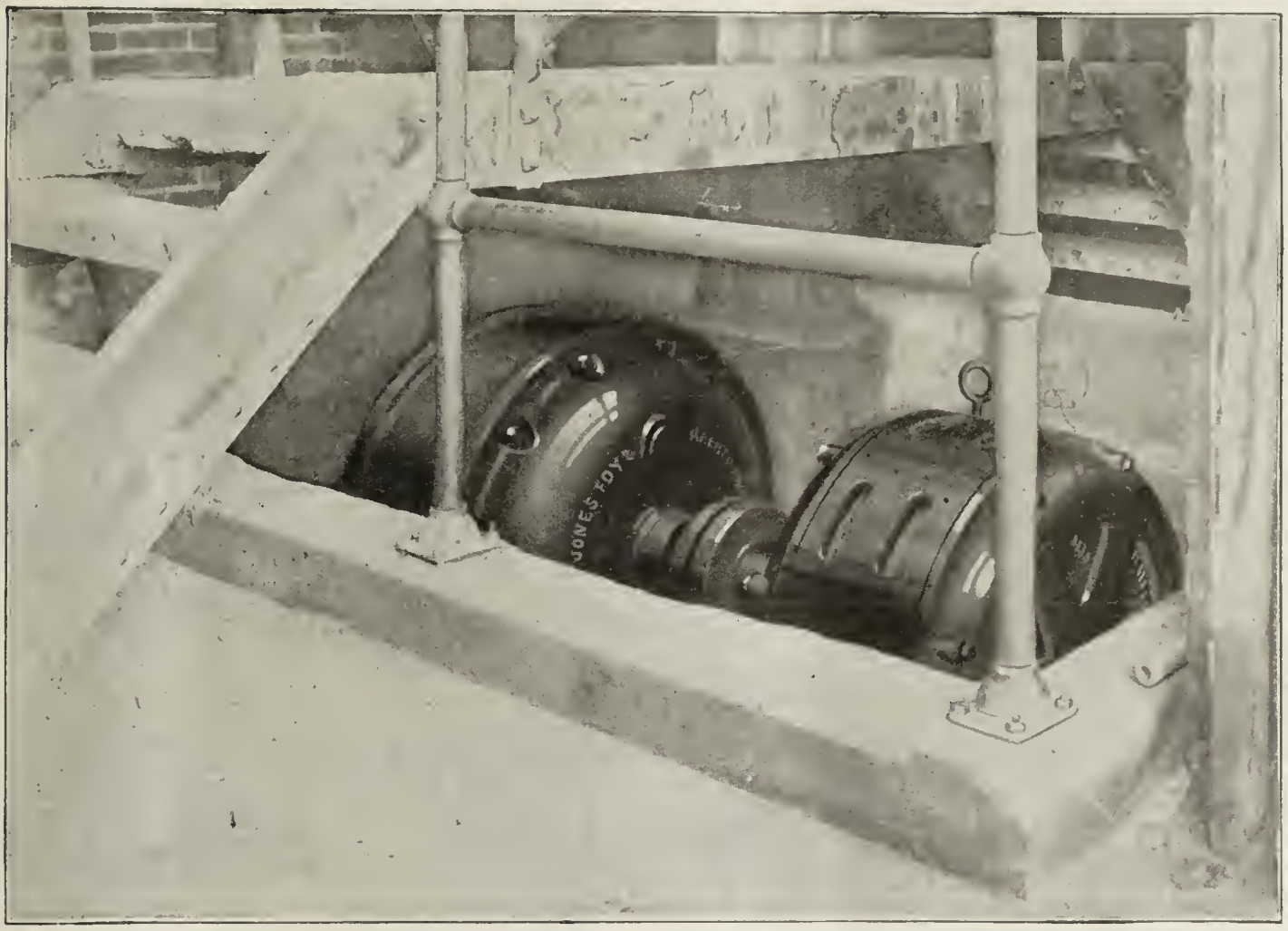

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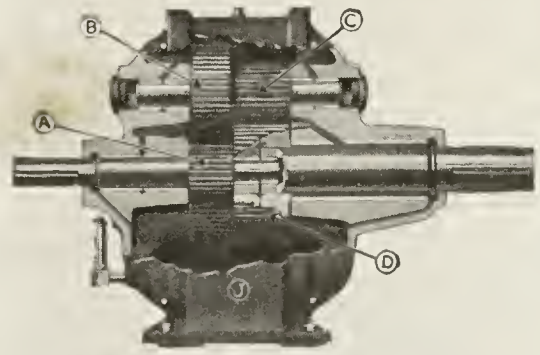

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B—Gears are mounted integral with the three pinions C.
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with which Gravel & Stone Magazine is Incorporated

22 Quincy Street, Chicago.

(PUBLISHED MONTHLY)

William Seafert, *Publisher and Editor*

J. F. Waldron, *Advertising Manager*

R. M. McCully, *Business Manager*

Telephone, Harrison 5397 Cable Address, "Seaferts" Chicago

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Advertising copy or changes in ads. must be in this office by the 25th of each month, as hereafter our magazine will appear on the 5th of the following month

Advertising Rates Sent on Application

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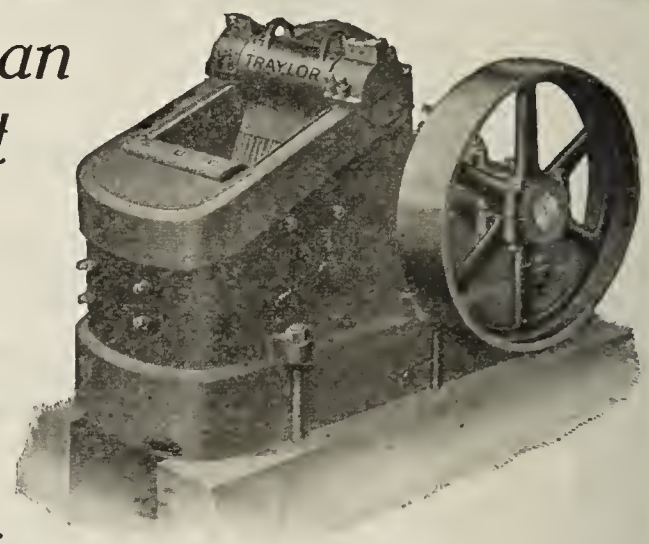
Traylor "Bulldog" Jaw Crushers Mean a Saving at Any Crushed Stone Plant



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And the Same Economy That's Found in Traylor "Bulldog" Crushers is Built in Traylor Motor Trucks and All Purpose Tractors

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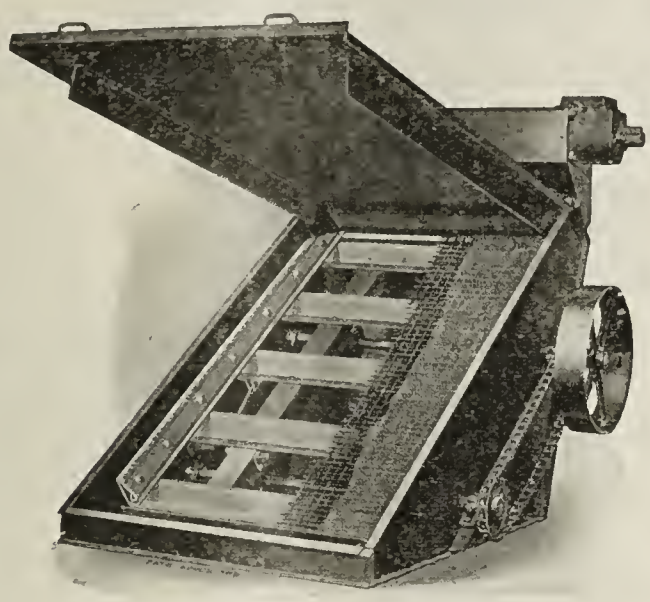

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A plant that tries to screen without a "Bucking Broncho" has yet to know true screen efficiency.

A simple, durable, inclined screen, built upon principles never before attempted, and which has proved a remarkable success. It not only has all the vibratory motion of other screens, but also has many others, not heretofore utilized. It not only has the ordinary up and down motion, but has a further to and fro and lateral motion, as well as a rotating motion, together with many slaps, jars and shakes. This tremendous amount of vibration not only screens the material far better than any former device, but also considerably augments its capacity per square foot of screening surface.

Its screening surface is not stretched, yet it cannot sag even if one stands upon it, because it is held up by the coarse foundation wires, resting on the saddle.

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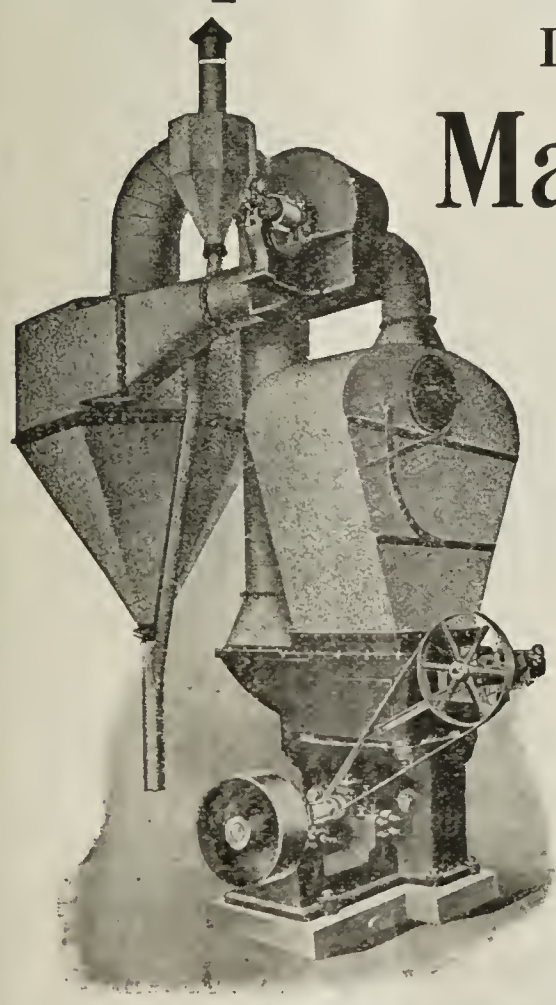

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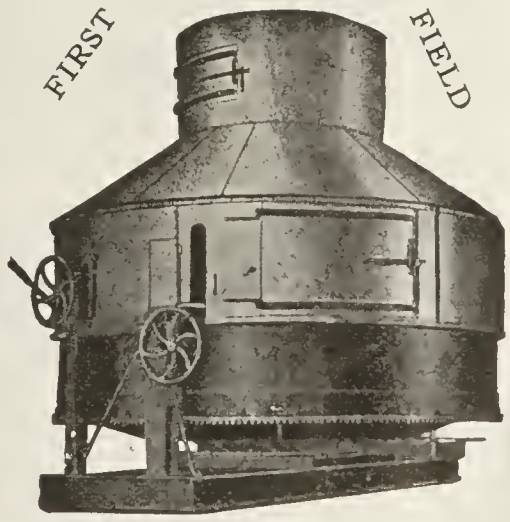

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Built for the Preliminary Pulverizing of Cement Materials

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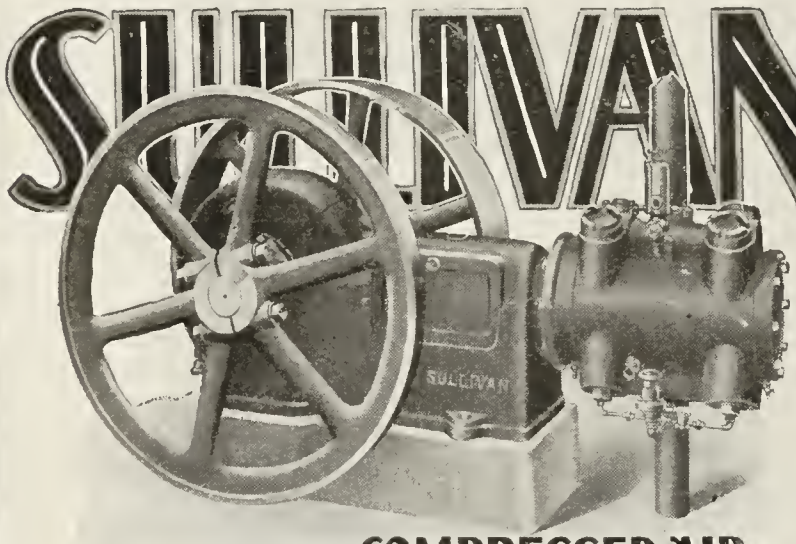

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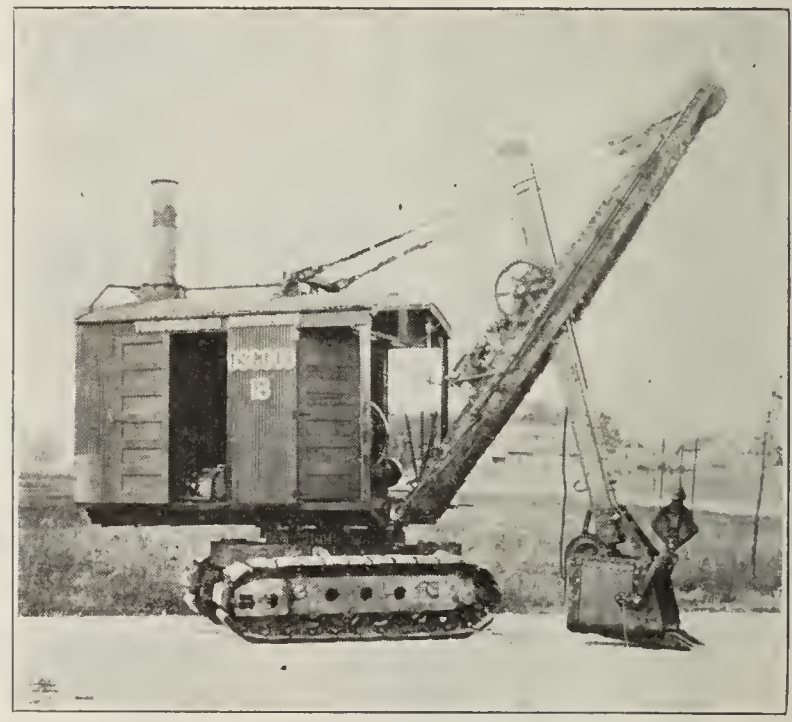

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You cannot afford to wait longer to investigate many improvements added to make the New 1921 Model Osgood 18 with its liberal dimensions and sturdy construction.

THE SUPER STEAM SHOVEL

Write, phone or wire today. Full information furnished. No obligation to you.

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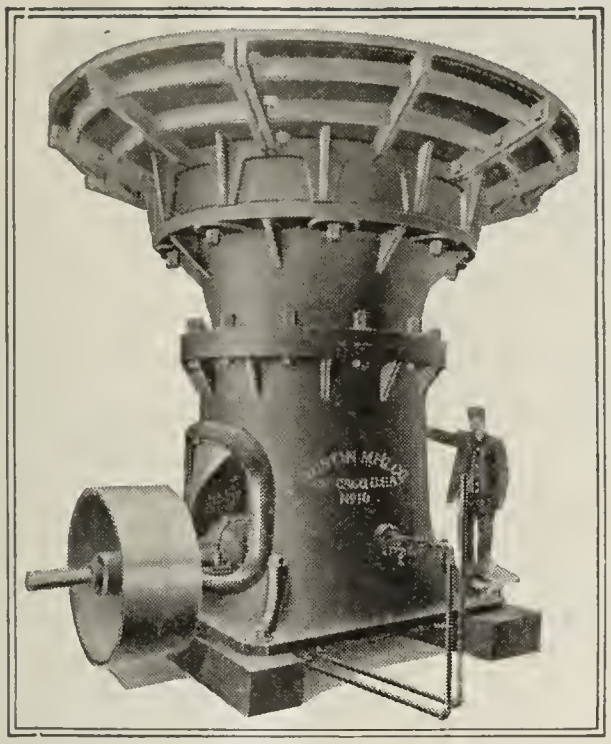

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5 to 500 Tons Hourly Capacity

Strength to stand up under severe shocks and strains, day after day and year after year—ability to turn out the greatest amount of work with the least expenditure of time and power—that is what makes a crusher efficient.

In Austin Crushers you get every advantage of the gyratory type plus features exclusively Austin which are responsible for its leadership in

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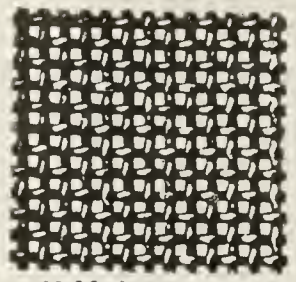
Cleveland Double Crimped WIRE CLOTH

2½ Mesh; .105 Wire



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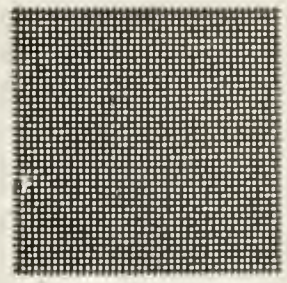

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You should use our screens because a uniform fineness of screened product is assured by an even, accurate mesh. This is a characteristic of "Cleveland" Double Crimped Wire Cloth.
Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

The Cleveland Wire Cloth & Mfg. Co.
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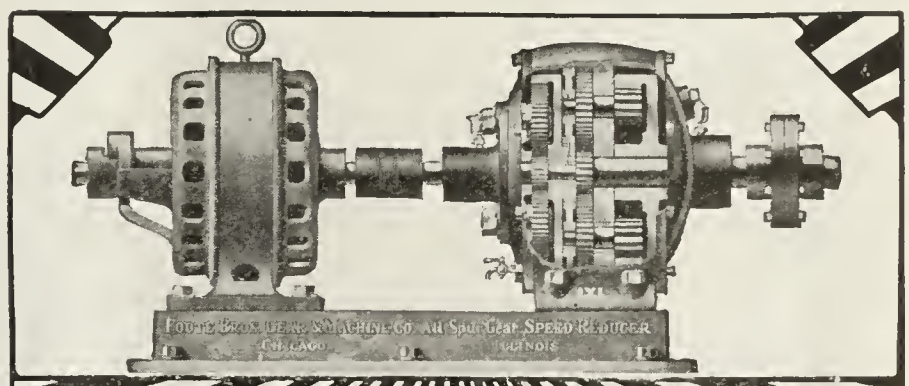

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Write to us, state the conditions that exist in your plant, and get the advice of our engineering department.

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Forged steel balls of special analysis steel from 2″ to 15″ in dia. carried in stock. Can't be excelled.

BALL MILL PLATES
CRUSHER SHAFTS
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We make quick service a feature of our business

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NO headaches!

EVERY user of explosives knows that the handling of explosives and the breathing of fumes are followed by a "Powder Headache"—a headache that MUST be endured whenever certain kinds of dynamite explosives are used.

But, when Atlas Non-Freezing is used, there are NO headaches and NO objectionable fumes. Think what this means to miners and blasters who always up to now have had to endure these headaches—think how they will welcome an explosive that WILL NOT cause headaches!

Atlas Non-Freezing, is made in different strengths. There are sufficient grades to meet every blasting requirement. It already has proved its high efficiency under every condition met in quarries, pits and mines for blasting rock, earth and ores.

Let us tell you what grade of Atlas Non-Freezing is suited to YOUR particular requirements. Simply tell us what explosive you are using now.

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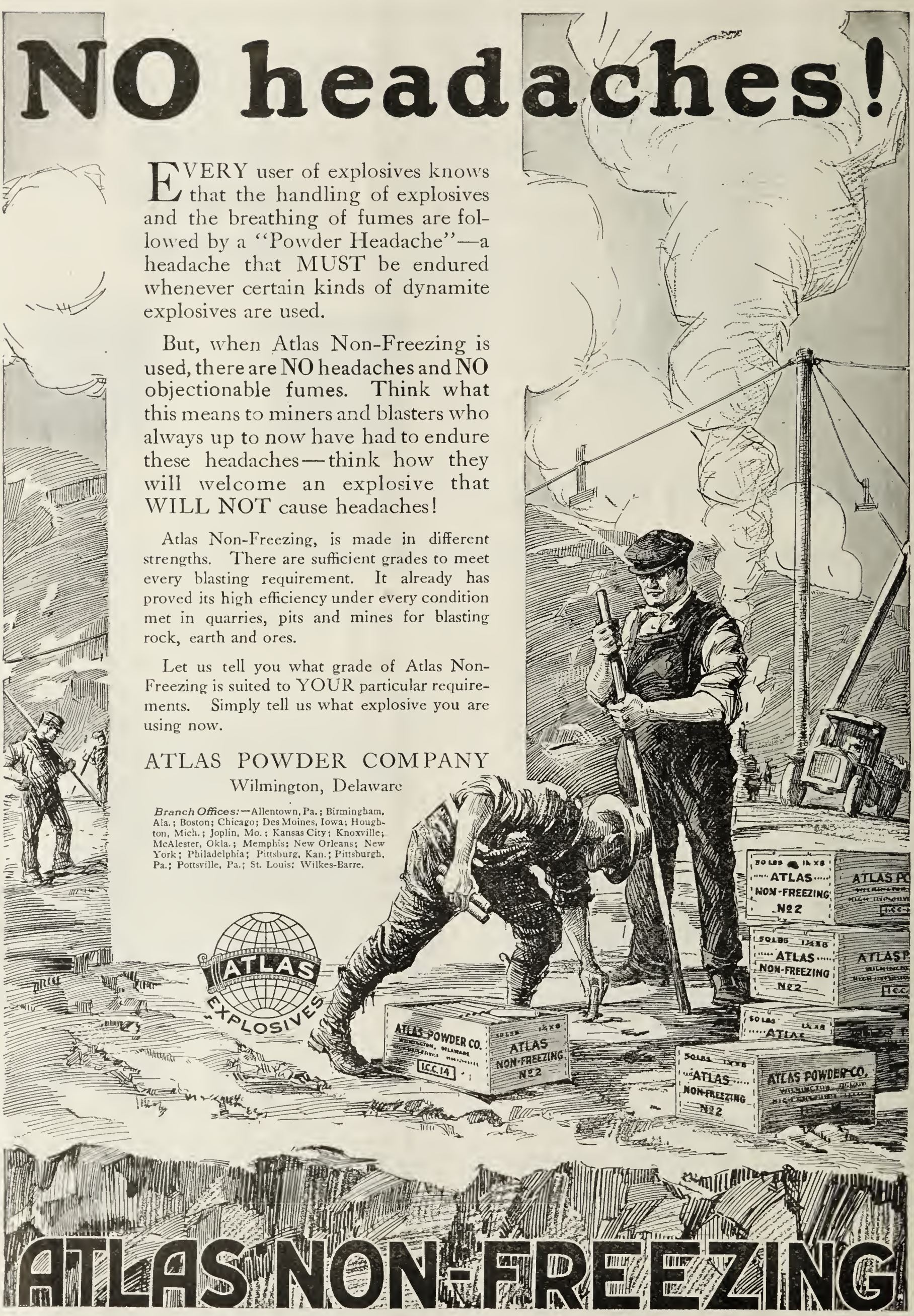

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DEPENDABILITY

In its final analysis, Taylor Mesaba Steam Shovel Chain is dependable. While its tensile strength is high, that quality is only one of many, for it has the ability to absorb sudden and severe shocks and recover therefrom time after time; it makes innumerable bends over comparatively small drums and sheaves while under enormous stress; and, withal, it is able to withstand excessive frictional wear. All of these qualities correctly combined in Taylor Mesaba Steam Shovel Chain, plus correct manner and method of manufacture, produce its dependability and at the same time they make it durable, economical and safe.

Made only by

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Mechanical perfection, rugged construction and excellent design are among the important features possessed by Ruggles-Coles Dryers that have lead engineers and owners to recommend them so extensively.

Ruggles-Coles Engineering Company

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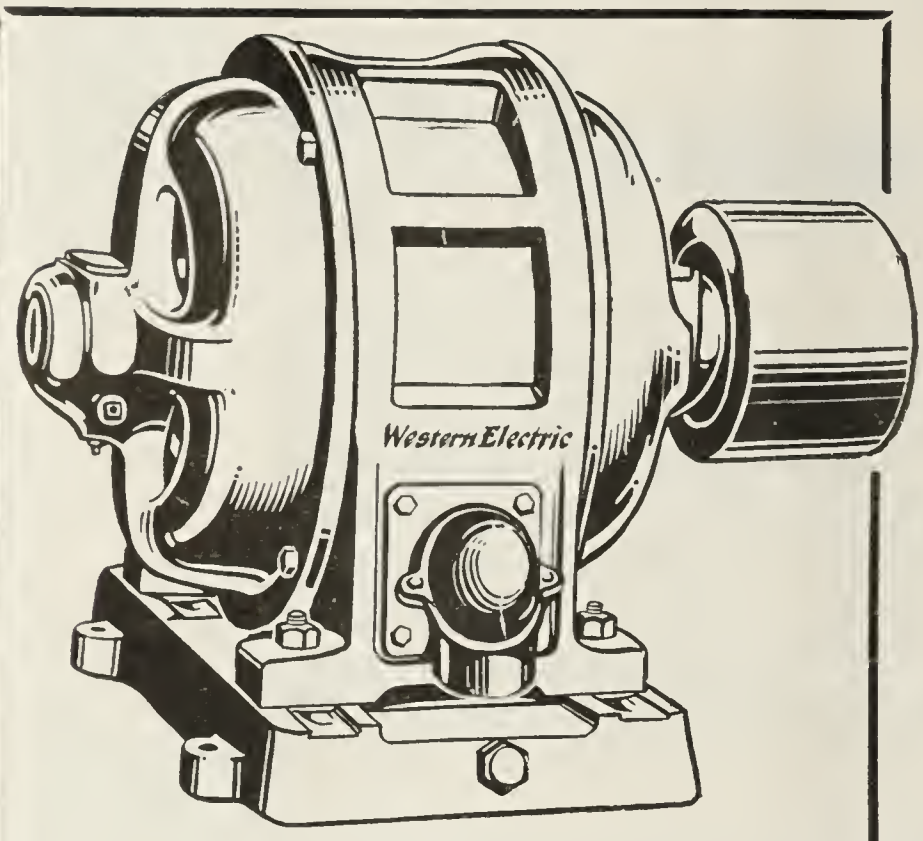

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That we have spent years of our time on your electrical problems? Years of untiring efforts which embraced university training, laboratory tests on material, plant analysis, etc? We offer you today the services of men from our organization who can carry your problems through to a successful issue, can meet your emergency just the same as we met others.

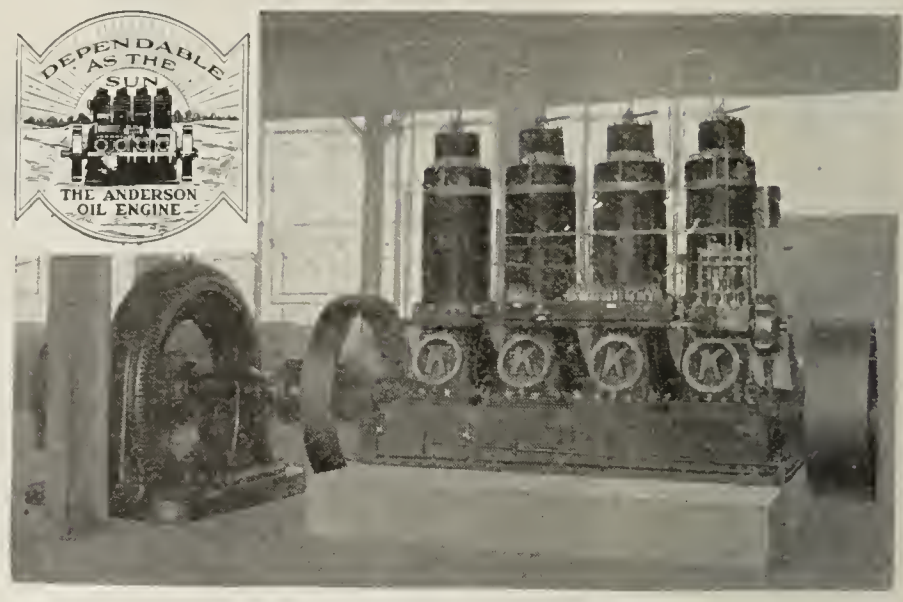
We are specialists in Motor Designing, Motor Building, Coil Building and Power Surveys. The knowledge we have gleaned after making a thorough study of cement mill plants and their operation, the experience we have gained through making the cement industry our choice of operations and our factory facilities we offer you now. We know we can be of aid to you and we also know you have your electrical problems to solve.

An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States.

Lansing Electric Engineering Co.

All the Name Implies

Lansing, Michigan



225 H.P. Type K Anderson Installation.

NEW ANDERSON TYPE K OIL ENGINES

Meet Every Power Requirement

Reliable | **15 to 225 H. P.** | **Efficient**

S imple to operate.
E ndures years of use.
R uns in either direction.
V ertical, proper construction.
I nterchangeable parts.
C an use small foundation.
E xacting speeds.

E asily accessible.
C an guarantee saving.
O perates on less fuel.
N o valves or trappy attachment.
O perates with less repairs.
M oney saved.
Y ear's guarantee.

Write for Catalogue and Information.

ANDERSON FOUNDRY & MACHINE COMPANY

A.F. & M. Co.

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ANDERSON, INDIANA, U.S.A.

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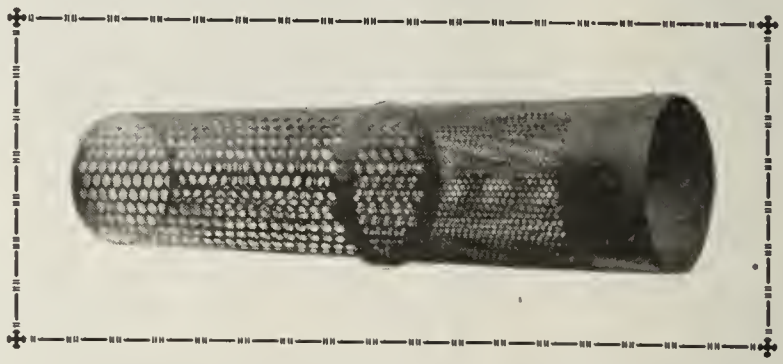

Made to suit your requirements. Advise diameter, length, thickness and size of perforations required.

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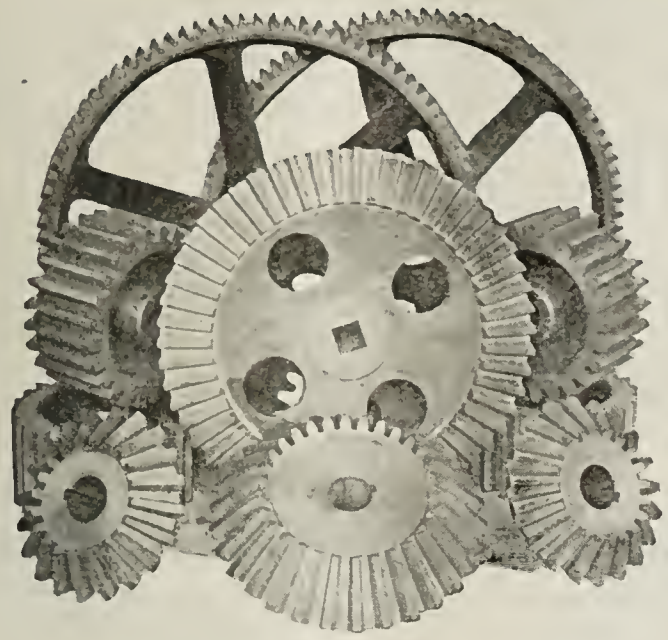

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Nuttall **BP** gears have proved to be the highest quality gears that the engineering field has yet produced for the various industries, including the cement industry and the brick industry.

Their superiority lies in their great strength and wearing qualities. The life of **BP** gears, even in those industries where gear service is of the severest nature, has proved to be four times that of untreated gears in identical service.

Specify Nuttall **BP** gears and renew your gears four times less frequently. **BP** gears can be furnished for any cement and brick plant requirement.

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If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

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We specialize on FABRICATED STEEL PRODUCTS and are equipped to furnish steel plate products such as Tanks, Hoppers, Stacks, Conveyors, Chutes, Pipe, Elevator Legs, Coal Mine Equipment, Cement and Concrete Sheet Steel Forms promptly. Let us estimate on your requirements.

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Analyze Your Drilling and Blasting!

Our new Blast Hole Catalog B-46 (96 pages) will help you.

The day of poking a hole down with a rivet header or a converted hay bailer is past.

Drilling, being the first step in stone production, is the most important. One cent or one half cent per ton cost saved in this operation often eliminates competition.

With Cyclone No. 14 Drills on the job and Cyclone Service in reserve, your drilling and blasting troubles fade—and your costs will be right!

THE SANDERSON-CYCLONE DRILL CO.
ORRVILLE, OHIO.
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First Class Silex Slabs

for lining of tube-mills for grinding of Cement, Clinker, Kaolin, Phosphate, Limestone, Quartz, Trap, Coal, Ores, Gypsum, Feldspar, Sand, etc. Have successfully passed some of the most severe tests. Long life and moderate price. Immediate shipment on stock sizes. Write for prices.

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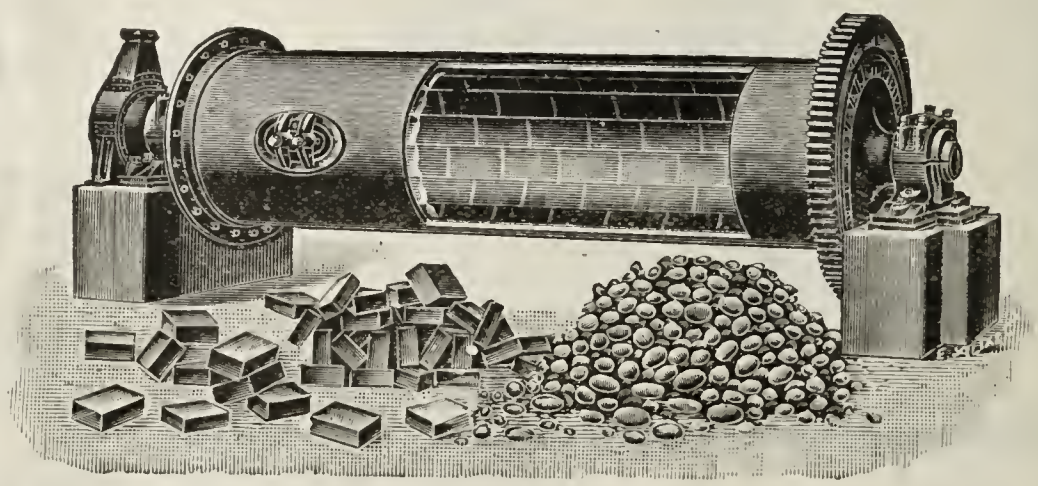

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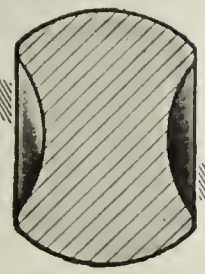

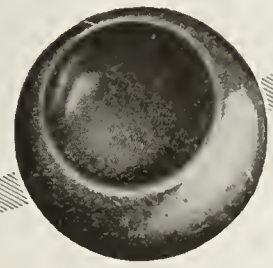

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Yesterday's Waste Is Today's Money

The material that used to be thrown away is saved today. As the natural resources become more difficult and costly to work, methods are devised for reclaiming materials from what has heretofore been considered waste.

Valuable materials are being saved by the use of Vulcan Kilns, from such former wastes as "lime sludge," quarry fines, blast furnace dust, waste pickling solutions and wastes from the manufacture of caustic soda, paper pulp, beet sugar, etc.

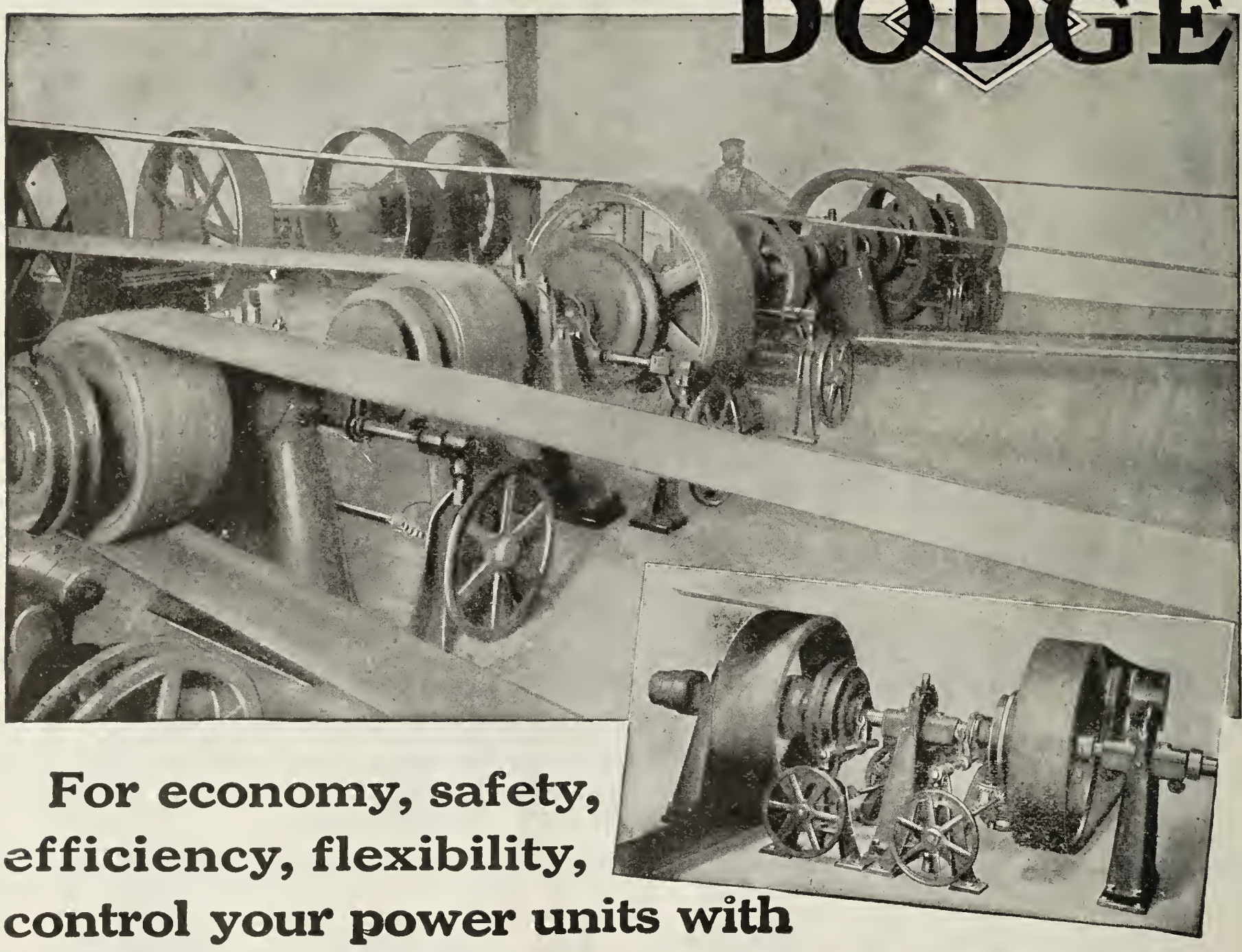
Are you throwing away material that can be made to produce money? Your chemical engineer can tell you about these processes, and a Vulcan engineer will be glad to tell you about design and construction.

VULCAN IRON WORKS

Established 1849

1740 Main St. **Wilkes-Barre, Pa.**

DODGE



For economy, safety, efficiency, flexibility, control your power units with

Dodge Friction Clutches

The manufacturer who does not make use of every device to prevent waste of power and labor is soon going to find himself facing a balance on the wrong side of his ledger.

Every department, line of shafting or machine that runs when not actually engaged in production wastes power. Every shutdown of an entire department to make some minor repair or adjustment wastes time.

Dodge friction clutches put every department, line of shafting and machine in your factory under individual control.

There's a Dodge clutch for every power unit from 1 H. P. to 1,000 or more H. P.

They will pay you bigger dividends than any other piece of machinery in your entire transmission system.

Place your order through the Dodge dealer. He can serve you promptly from his own stock or from one of our fifteen warehouses.

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Cement and Engineering News

Vol. 33 Chicago, August, 1921 No. 8

Portland Cement in the First Half of 1921

The approximate production and shipments of finished portland cement in the United States, by months, and the stocks at mills at the end of each month, during the first half of 1921 are shown in the accompanying table. The total production for the six months ending June 30, 1921, represents about 94 per cent of the quantity made in the corresponding period of 1920 and over 42 per cent of the total production in 1920; the shipments are about 98 per cent of those of the first half of 1920, and nearly 42 per cent of those for the whole year 1920. The stocks, which amounted to more than 11,000,000 barrels, are slightly above normal, comparing with approximately 9,000,000 barrels on June 30, 1920, and 8,941,046 barrels on December 31, 1920.

The year 1921 began with mills producing at a moderate rate and shipments considerably less than production, but month by month both production and shipments of finished cement increased at a rapid rate, shipments exceeding production in May and June. Production in June was slightly greater than in June, 1920, and also a little above the average for that month during the last five years. The shipments in June of more than 10,500,000 barrels were larger than those of any preceding June.

Clinker (unground cement) produced during the first six months amounted to more than 43,500,000 barrels, more than 9,000,000 barrels of which were produced in June. This is also a new high record. Stocks of clinker are reported to be more than 4,600,000 barrels, a quantity slightly above normal.

These figures indicate that the cement industry has enjoyed relatively greater activity than many of the other large mineral industries during the first half of 1921, and that stocks of finished cement and clinker, while not excessive, are ample to supply any reasonable demand.

These statistics, which were prepared under the direction of Ernest F. Burchard are based largely upon reports from manufacturers of portland cement and to a small extent upon estimated data, and are subject to revision. It is hoped to issue similar statistics of the portland cement industry each month in the future.

Finished Portland Cement
Production, Shipments, and Stocks
By months in first half of 1921

Month	Production (Barrels)	Shipments (Barrels)	Stocks at end of month (Barrels)
January	4,098,000	2,539,000	10,300,000
February ...	4,379,000	3,331,000	11,400,000
March	6,763,000	6,221,000	12,000,000
April	8,651,000	7,919,000	12,600,000
May	9,281,000	9,488,000	12,450,000
June	9,296,000	10,577,000	11,150,000
Total	42,468,000	40,075,000	.....

How Various Colors and Textures Are Produced in Cast Concrete

Concrete architectural stone is available in so wide a variety of textures and colors that these qualities are brought under the complete control of the designer and may be varied as required to match any other wall material. Granite in pink, red, yellow, gray or green; marble in pink, red, yellow, green, black, white and mixed; mica spar in black and transparent colors; sandstone in yellow, buff, red and brown; and sands in a wide variety of shades are the aggregates chiefly credited with making this possible. Then there is the choice between white cement, gray cement and a mixture of the two, and a few reliable mineral pigments which are practically non-fading when used in small quantities.

In the use of mineral aggregates the experienced concrete trimstone manufacturer knows that color and texture are controlled very largely by the grading of the particles. Where there are smooth or delicate surfaces and fine edges, obviously the particles must be limited to small size. Coarser textures are obtained with larger particles and drier consistencies, some textures requiring almost an entire absence of finer material. More pleasing color effects are secured where the fine aggregates are of one color and the coarse particles of another, giving a blended result the shade of which will be influenced by the larger or finer particles in proportion to the relative surface space occupied by each.

Mineral pigments are used sparingly for concrete surfaces exposed to the weather. Half a pound to a pound of red oxide of iron to the sack of cement will produce pink, while greater quantities of the oxide, up to about six pounds, will produce colors varying from terra cotta to red. Gray may be produced with half a pound of carbon black to the sack of cement and added quantities of the black with gray cement will produce slate to black shades. Light buffs and yellows are produced with five to 10 pounds of hydroxide of iron, to which red oxide in small quantities may be added.

New Flat Slab Decision

Flat Slab Patents Company Lose Decision Because of the Uselessness of the Norcross Disclosure.

A decision of great interest to the profession and concrete building owners generally, was rendered April 26th, last, in a trial before a jury in the Federal Court at Minneapolis, Hon. W. H. Booth presiding judge. The case in point was the Flat Slab Patents Company vs. Northwestern Glass Company, defendant. Complaint alleged infringement of the Norcross patent, and claimed damages for infringement by use of the concrete structure during the life of the patent, and suit being brought two years after the patent had expired.

Evidence was first introduced by the plaintiff to show novelty of operation in the structure of this patent. The principle was defined by the patent expert Carter for the plaintiff, as that of the steel taking tension and concrete compression, as set forth in the patent. This principle, as most engineers suppose, is broadly older than the Christian Era, as evidenced by the flat arches still standing in the ruins in the ancient city of Rome, made up of Puzzolan concrete and hammered iron tie rods buried therein. Further, novelty was the flat arch action discovered by Norcross and described by Carter as of that peculiar order in which no horizontal thrust was developed at all.

Commercial Use.—Carter admitted never having seen or heard of any structure in which the metal reinforcement was disposed in a manner following the Norcross disclosure in the bottom of the slab throughout and strips not covering the area therein. He admitted the development of greater strength, longer spans and increased carrying capacity by the arrangement first disclosed in the Turner patents, but these he said were but mere refinements of the principle of the flat arch or beam.

(The Patent Office decision to the contrary held they introduced the remarkable resistance of dish shaped curvature imparted for the first time to the non-homogeneous plate in combination with cantilever and suspended span action.)

All testimony which might bring into question the truth from the mechanical standpoint of the holding of the Circuit Court of Appeals in Drum vs. Turner, was objected to and sustained by the Court on the ground that this decision was the fixed law of the circuit and that defendant's structure was under this fixed law an infringement of the Norcross patent because it was admittedly a Turner structure.

Much evidence was introduced to show that there was a fixed or established royalty. The contracts brought into court, however, were contracts embodying the right to make, sell and use, combined. No contracts were introduced representing merely a license to use.

The Court instructed the jury that no fixed royalty had been established and in view of the admittedly useless character of the Norcross grant, the maximum finding of damages must be limited to a sum not exceeding one dollar. On the other hand, that if the jury found that sufficient notice had not been given the defendant the jury should find for the defendant, and the costs would be assessed to the plaintiff. The Jury found insufficient notice, and the Flat Slab Patents Company must pay the costs in the suit and recover nothing.

The holding of lack of fixed royalty will, it is believed, put an end to the innumerable threats of suit and the wholesale attempts to blackmail owners of flat slab buildings.

The books which were produced, it is said, showed that the Flat Slab Patents Company had collected from the unsuspecting public on this worthless paper patent, upwards of three quarters of a million dollars. The collection of a larger portion of this sum was undoubtedly due to the misrepresentation in printed circulars and pamphlets that the Supreme Court of the United States had passed on the Norcross patent, and decreed its scope and effect. Counsel for the plaintiff admitted writing the pamphlet containing this misrepresentation but offered the excuse that he did not know the law in the matter, but nevertheless, had done nothing to set right those who had been deceived further than that he had modified a later pamphlet dealing with litigation.

The holding of uselessness and non-commercial use of the Norcross structure established by plaintiff's witnesses is in strong contrast to the holding of the Court of Appeals in Drum vs. Turner, which we quote as follows:

"The review of the prior art, the long and fruitless endeavor before the disclosure of this patent to find a way to construct concrete floors for large buildings without beams or girders, the gradual approach to the desideration, its first conception and reduction to practice by Norcross, and its large and successful subsequent use, have satisfied that his flooring and his method of construction were not within the reach of the mechanic skilled in the art, but were novel and useful and the product of the genious of the inventor."

To one unfamiliar with the curious proceedings in the trial for infringement of a patent, such a false conclusion by a high court is inexplicable and a word of explanation may be instructive to the engineer reader.

In the twilight of a mid summer evening in the country, one hears the song of the Katydid from one direction and from another comes the answering refrain, Katydidn't. Expert testimony in the patent suit is of this Katydid—Katydidn't variety, much to the mystification of the court unfamiliar with mechanical principles and the history of the art.

In the original Drum suit, the Katydid testimony was that the Norcross patent operates on the same principle whether the steel is in the top or bottom of the slab, given by Prof. Hatt of the Joint Committee of the American Society of Civil Engineers, Arthur R. Lord, Research Fellow of the University of Illinois, Henry Carter and Walter Curtis, alleged patent experts of Chicago for the affirmative. The Katydidn't testimony presented was that of Turner that the principle of rigidities governed the distribution of stresses and Norcross was nothing but a flat arch, differing in principle from the continuous plate which was a commercial success. This testimony corroborated by Henry T. Eddy, professor of mathematics and mechanics of the University of Minnesota, substantiated by engineers Martin, Kavanaugh and McMillan. No patent experts were utilized in the Turner defense.

The idea of wide commercial use was conveyed to the court by the testimony of Hatt and his fellow expert Lord, that they had constructed a Norcross floor by raising the Norcross steel from the position Norcross shows it in the bottom of the plate to the top of the slab over the supports and by widening out the strips of Norcross until they covered the area. The

structure then became, according to these witnesses, "Modern Norcross" in contradistinction to the worthless, unused, inoperative Norcross disclosure.

The vital characteristics necessary according to the Patent Office to achieve results which practical men had regarded as impossible before Turner's success had thus been added by these witnesses to the antiquated failure of Norcross and the commercial success achieved by the adoption of means which Norcross, when applying for his patent No. 698,542, had no idea of but which he afterwards attempted to patent a form of in 1916, resulting in his later patent 1,247,865, issued November 27, 1917, twelve years after Turner had applied for protection on the invention of these details.

Having no means of deciding betwen the Katydid—Katydidn't testimony of the experts without knowledge of mechanical principles or the state of the art, the courts are to be pitied rather than censured but from the standpoint of the utility of the patent system diverse holdings of one court accepting the Katydid testimony and the other accepting the Katydidn't and holding that the fruit of the inventor's genius is first an aggregation or unpatentable thing on very old references by one bench of a court of appeals and directly thereafter holding it an infringement of a patent issued years after the very references which made it unpatentable, constitutes answering the same question yes and no upon the same state of facts against the same litigant dependent on whether he is plaintiff on the one hand or defendant on the other.

The United States Patent system then, instead of working toward encouragement of progress in scientific arts, tends toward the failure, penalize the success, impoverish the inventor, furnish a rich field for the unscrupulous patent pirate who best knows how to mislead the honest judge, and becomes the root of eighty per cent of the business dishonesty in the country at large.

This state of affairs is epitomized by the Patent Law Association of Chicago reporting on the Oldfield Bill, in the statement that patent litigation is expensive, its results uncertain and decision conflicting must be admitted. Unless this unsatisfactory condition be remedied by the early appointment of a patent court of appeals, the qualifications for which shall be competent scientific and legal knowledge combined, the sooner the infliction of such unscientific decisions on the public is ended by the abolishment of the patent system the better.

Efflorescence on Face Brick

How It Can Be Economically Avoided

Probably one of the things most annoying to architects, and owners of brick buildings constructed in recent years, is the unsightly appearance of efflorescence on the brick every spring, in some cases completely covering the upper stories.

It has been noticed that this is more pronounced under the copings, sills, belt courses, etc., or wherever a part of the building has been subjected to a greater wash by water. This indicates that the mortar, as well as the brick, is absorbent, causing the walls to become thoroughly soaked during the winter months, while the warm rays of the sun attract the moisture to the exterior, bringing with it the lime, magnesia and alkali salts contained in both the brick and the cement mortar.

It is agreed by all interested in brick construction that both brick and cement mortar is absorbent, yet little has been done to overcome this objectionable, serious and dangerous obstacle. Hydrated lime will add to the plasticity of the mortar, increase the density, and being a water retainer, will add crystallization when used in places where it is difficult to apply water at frequent intervals, but should never be considered as a waterproofing material. Tests have repeatedly shown that slabs containing 10% hydrated lime, when taken out of the water, after one hour will contain a larger percentage of water than a similar sample of cement and sand, yet on the surface the lime sample is apparently bone dry.

The best known solution of the above problem, which has withstood a test of over two years, having been adopted in the construction of a prominent eastern college, is as follows:

Impervious Cement Mortar to Consist of

One part approved portland cement.

Three parts sharp, clean sand, showing not over 35% per cent voids by water.

Ten per cent of weight of the cement of hydrated lime (sufficient to add to the plasticity of the mortar, and retain enough water to perfect crystallization).

Two per cent of weight of the cement, Medusa Paste Waterproofing. Each gallon (8 lbs.) to be mixed with equal parts of water, later adding twenty more gallons. All mortar to be guaged with this solution.

If the sand is damp, a 1 to 15 solution should be used to offset the moisture already in the sand.

All exterior brick and stone work to the depth of 12 inches should be embedded in this mortar.

The extra cost of waterproofing the cement mortar will not exceed $1.00 per M bricks.

Subjects that Need Study

The Committee on Research of the American Concrete Institute in its report to the recent convention gives the following subjects that need study in the field of concrete:

1. Proper methods of measuring quantities going into a batch of concrete.
2. Collection and correlation of data to show quantity of set concrete which can be made from given amounts of different aggregates.
3. Establishment of a standard screen scale for concrete aggregates and limits of variation in sizes of different classes of aggregates.
4. A standard field method for determining consistency of concrete.
5. A standard field test for strength of concrete.
6. Tests to ascertain the efficiency of various types of mixers in making concrete.
7. The allowable variations in sizings of aggregates.
8. An index of quality of aggregates as determining their value in concrete.
9. An abrasion test for gravel.
10. The production of plant-mixed aggregate.
11. A method of evaluating various forms of mechanical anchorage of reinforcing bars in reinforced-concrete beams and slabs.
12. The value of clay tile built in with concrete beams in adding to the shearing resistance of the beam.

Proportioning Gravel for Concrete

By C. E. Woodward, Professor*

While concrete has been used for so long a time it is only within the last few years that scientific study has been given to this material to determine the best proportions in which to mix the ingredients of cement, fine aggregate and coarse aggregate. We are beginning to understand the most important elements which influence the design of a concrete mix, and how to vary the aggregagates, etc., so as to produce a stronger concrete. Some day instead of thinking of what we call 2,000-pound concrete, we may think of 4,000- or 5,000- pound concrete to be secured by good material and by proper mixing.

What controls the strength of concrete? I suppose the best concrete will be most like a good natural stone, the particles near together and connected with the thinnest layer of a strong cement. How shall we bring this about? In the first place, we must have clean uncoated aggregates; and second, a strong cement; in the third place, and very important, the cement paste of water and cement must be as strong as possible, not too dilute by the use of too much water.

Water in concrete. Water is needed for two services —first, to act chemically with the cement so that it will set, and, second, it lubricates the aggregate and allows the contractor to put this more or less plastic mass in position. The secret of getting strong concrete with economical use of cement is to use as little water as possible for the particular job. I want to show later on that the character and grading of the aggregate may control the strength of the concrete through its effect upon the amount of water that must be used.

Amount of water required. Of course, different classes or jobs require different conditions of concrete with respect to its flowing properties. For instance, concrete which is to be put in narrow walls containing reinforcing steel must be quite fluid; a road concrete may be less fluid; and concrete in a sidewalk, that is to be tamped, may be quite dry. Up to a certain limit the drier concrete will be the strongest, because the cement paste is less dilute. If all three jobs were to have the same strength we would have to use more cement or richer mix for the more fluid concretes.

Character of aggregate. Now it may be asked: Can we not avoid the excess water (and the excess cement required to balance this excess water) by some other means, say by changing the character and graduation of our aggregate? The answer brings us to consideration of the effect of grading of aggregates, which grading is generally specified by the engineer.

To introduce this topic let us take a well-known case. Everybody knows that you cannot produce a strong mortar or a good wearing top to a sidewalk by using a very fine sand, and that the strongest mortar is made with the coarse sand, having, say, sixty per cent of its volume in the coarser particles between the ⅛- and ¼-inch sieve. Now the reason for this is that to obtain the same working qualities or consistency, the fine sand requires more water and if we use the same amount of cement we get a more dilute paste. We cannot entirely make up for this by increasing the amount of cement, because then the top of our sidewalk will not wear well. On the other hand with the coarse sand less water is required and there is a stronger cement paste.

The reason in turn that more water is required with the finer sand is that there is a greater sand surface to be wet and lubricated

We are beginning to think that there is some element in the grading of sand and gravel that is connnected with the surface areas to be covered with cement paste that controls the character of the concrete. Engineers design concrete sometimes by specifying that there shall be three pounds of cement for every 100 square feet of the surface of the aggregate. Now if the contractor supplies an aggregate that is too fine, that is one with greater surface, the engineer will increase the amount of cement and water to get the same strength and the same working consistency. All this, of course, is worked out by scientific experiments beforehand.

The grading of aggregate. So that when we are thinking of sand and gravel we should think of the two together and a combination of the two, which will produce as small a surface area as is practicable or the best amount of some other measure, like what is called the fineness *medalas*. In other words, one part of fine sand below a ¼ inch, mixed with two parts pebbles, will not give as good a concrete as a one part of coarse sand below a ¼ inch sieve, mixed with two parts pebbles.

This suggests the thought that the division between sand and gravel on the ¼ inch sieve is not the fundamental thing and that we should think of our aggregate as a whole, that is combined sand and gravel. The relation between size does not suddenly change when we use the ¼ inch screen. Practically, there is a considerable variation of grading from sand up to gravel that will yield concretes of equal quality. Instead of specifying cast iron limits we should allow the used clean washed material whenever the producer demonstrates by actual test that concrete of suitable quality can be made by the sizes he can furnish.

Another thought may be introduced here, namely, that we need a certain amount of fine sand and not all coarse sand in the concretes; otherwise concretes become harsh and unworkable, does not finish easily and the concrete does not hold together on the job, but separates when it is being placed.

Proportioning gravel for concrete. Our gravel deposits are of great economic value. Nature through the operation of ice and other agencies has done enormous work grinding up the rocks and depositing them ready for use. In some cases the coarser pebbles predominate and in other cases the sand predominates. The old style specifications, which demand two parts of sand to four parts of pebbles regardless of the sizings of the sand or the size of the pebbles, result in an economic loss. In the first place, there is a portion of the deposit wasted, and in the second place, in the endeavor to obtain too close a separation between the coarser sands and the finer pebbles the screening is slower and the output of the plant is cut down.

All of these considerations lead us to inquire, first, if a larger proportion of the coarse sand may not be permitted to come over with the coarse aggregate without prejudicing substantially the quality of the concrete; and, second, in general within what limits we may change the proportion of sand and pebbles and adjust the amount of cement to the mix to obtain concrete of equal quality?

In the first instance we may specify what is called a tolerance of coarse sand below the ¼ inch screen to be allowed to lie in the pebbles. In the second case we adjust the mix of the concrete from, say 1-5 with 40 per cent sand, to 1:4.5 with 70 per cent sand to ¼ with 80 per cent sand.

Both of these provisions are proposed in modern practice.

The first inquiry, the proper amount of tolerance, has

*Purdue University, Lafayette, Ind.

been answered by tests of Indiana sands and gravels at Purdue University for the Indiana Sand and Gravel Producers Association, an account of which will now be given.

This is an instance of the value of definite experiments to answer questions which arise in the economic management of an industry. The dividends from small expenditures are enormous. A thousand to two thousand times the value of the experiment may easily be accounted for. Modern warfare is conducted along scientific lines and modern business management must also be scientific. The day of the pioneer and the wasteful methods of the pioneer days are gone. The cement interests, the lumber interests, the terra cotta interests, the lime interests are all organized technically with their investigating staffs and they co-operate with engineers in the formation of technical standards with technical publicity.

I must congratulate the Indiana Sand and Gravel Producers Association which first in 1915, then Mr. Hottstetter and later in 1920 through its offices has pressed these problems upon Purdue University, the State Technical University. I trust that the National Sand and Gravel Producers Association will also find itself in a position to take up seriously and systematically the very important problems of the industry that must be solved by scientific methods.

Just now engineers are drawing up specifications for grading of sizes of aggregates and the producers who know the practically central elements should join in this work. What are some of these technical problems?

(1) Plant mix—
Save: Car space,
Handling,
Storage space.

(2) What are proper proportions and sizes of cement, sand, and pebbles to yield concrete of a specified grade?

"(3) In what portions of the country do prejudices prevail against the use of gravel?

"(4) What are the facts underlying the recent tendency to rule out gravel, or limit its use for fireproof concrete construction?

"(5) What is a good test for the hardness of gravel?

"(6) What should be the specifications for sand to be used in concrete for specified purposes, as wearing surface, structual concrete, water-tight concrete?

"(7) What should be the specifications for gravel for gravel roads, for ballast?

"(8) Can we not standardize the definitions for the terms now used with some confusion as gravel, sand, pebbles. Does gravel mean sand and pebbles or only pebbles?

"(9) Branded plant mix."

Dryers for Coal, Cement Materials, Sand, Lime, etc.

As different materials require different treatment in drying, no one type of dryer can be used for all purposes. There are a few points, though, that should be kept in mind when considering a drying problem:

To utilize every possible heat unit—and thereby increase the thermal efficiency and decrease the fuel cost; to have a machine that can be easily regulated if the moisture contents of the material or other local conditions change; and to have a dryer that is designed and built in such a manner that it will give continuous and uninterrupted service.

While the necessary draft for drying, no matter what type of machine is used, may be produced by a stack, this is only possible where the stack gases are at a comparatively high temperature. This, of course, causes a loss of heat, and when once installed, no increase in the amount of draft can be obtained without increasing the height of the stack or raising the temperature of the gases. The Ruggles-Cole Engineering Co., 50 Church St., New York, N. Y., so designed their dryers that an exhaust fan may be used, and each machine may be regulated to give the best results as to capacity and efficiency.

The Ruggles-Coles Co. have been asked at various times why they do not give capacities, power required, fuel consumption, etc., in their catalog. They do not do this as the same dryer on different materials will give different results. They will be pleased at any time to give all details of their dryers working on various materials, but before giving this detailed data, it is necessary to consider specific cases. They can then give prospective clients the full benefit of their engineering experience of twenty-seven years in the design, manufacture and operation of over one thousand dryers.

They give in their new No. 16 catalog a brief description of some of the uses of their dryers in various industries, in the hope that they may be of some value to those who are contemplating the installation of drying machinery.

Excavating and Conveying Sand and Gravel

"When deciding on equipment for your gravel plant adopt the system of excavating and conveying that will handle the material from pit to plant at the lowest cost per ton.

"Convincing proof is at hand that a Sauerman Dragline Cableway Excavator can dig and deliver to the hopper of a screening plant a definite tonnage of sand and gravel at a lower per ton cast than is possible by the use of any other equipment or combination of equipment," writes Sauerman Bros., 1139 Monodnock block, Chicago.

"The cost figures that furnish the basis of the above statement have been contributed by leading gravel producers who have operated Sauerman Dragline Cableway Excavators for a period of years, and some of those producers employ several of our equipments at different locations with consequent variations in conditions and requirements.

"The commercial operator who can handle his material at lowest cost per ton has the advantage in the competition for business, and that is one of the big reasons why the Sauerman Dragline Cableway Excavator must be given first consideration in connection with any plans for a new gravel plant or for improvement of an existing plant.

"Our leadership in designing and manufacturing dragline cableway excavators is backed up by a staff of engineers with years of experience in laying out and installing this type of equipment to best meet the individual requirements of each proposition. Let us know the details of your problem and we will submit our suggestions."

The Contractor's Chief Menace

By Samuel G. Kuhlen*

Contractors are not immune from the one bane common to all industries, that of "leaks" through misuse and waste of time and energy. Masters of efficiency have not yet succeeded in completely eradicating this drain on profits from any line of business, and there are few lines which offer so many obstacles to thoroughgoing efficiency as contracting.

Since labor is, perhaps, the contractor's largest single cost item, great care should be used in its conservation. As a general rule, however, it receives scant attention. Many men are still employed for work which can be much more economically handled by machinery.

Paving, for instance, affords striking examples of inconsistency. Few contractors would even think of mixing concrete by hand. No, indeed, nothing short of the largest and fastest machines would answer for this important duty, or how could bids be figured to win? Yet the majority of contractors still use hand labor for all the remaining operations, in spite of the fact that perfected machinery is now available which tamps, strikes off and finishes, combining these three operations in one and doing it as fast as the mixer can lay down the batches. If contracts can be won without this extra efficiency, is that sufficient ground for rejecting it? If the added profits are not attractive, why bid at all?

Idle paving machines are another serious drain on profits. Large amounts are often lost on one contract by keeping fast machines of generous capacity, together with their crews, waiting for batch materials. This can be avoided by the use of narrow-gauge gasolene locomotives and batch cars.

Equally wasteful is the wide-spread practice of filling ditches by hand instead of using a back-filler. As with paving, so here, machines are universally used for the first operation, that of digging, while the equally important work of replacing the earth is usually still done with slow, expensive hand labor. This is too often complicated by leaving the back-filling to be done at some future time. In the meanwhile the ground freezes or forms into a solid mass, requiring an extra force of men with picks to break it up before it can be shoveled. Then, too, contracts are not paid in full until thef are completed, adding one more "leak" to the extra cost of hand-breaking and filling.

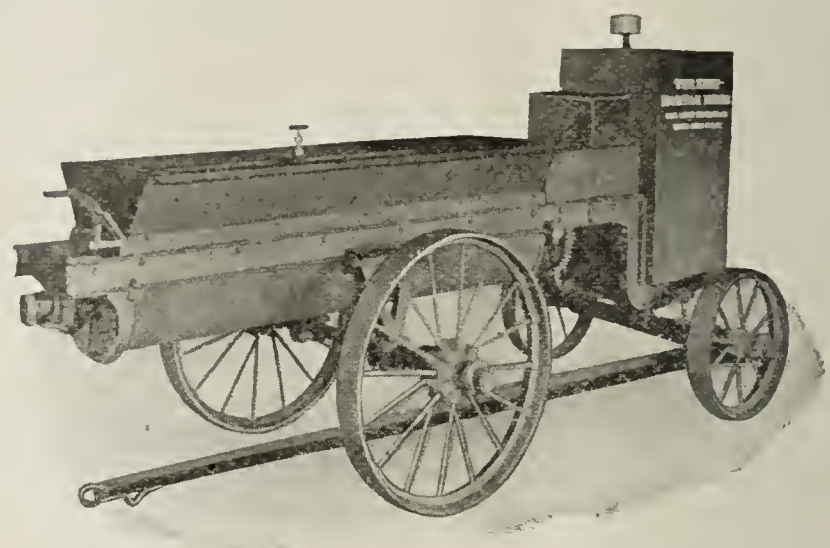
Many contracts fail to return proportionate profits because of worn-out or antiquated equipment. The temptation to squeeze the last dollar out of an investment is quite natural, but the time inevitably comes when excessive repairs or capacity limitations spell the doom of this class of inefficiency. The poorly equipped contractor cannot hope to compete successfully with his more progressive rival. If he figures to make a profit on his costly methods he is sure to lose contracts and if he figures to win contracts he will as surely forfeit his earnings in their execution.

Right now, at the beginning of the greatest road-building and construction era, is the time to check up on equipment, and fill the gaps between efficiency and inefficiency.

*Austin Machinery Corporation, Chicago.

The Kent Mortar Mixer

The Kent mortar mixer illustrated herewith is the best by every test, says the Kent Machine Company, 130 Second Avenue, Kent, Ohio. This mortar mixer includes every improvement and convenience for rapidly and thoroughly blending the aggregates, at a labor



reduction which is surprising. Its performance on various jobs throughout the country has shown its great speed, strength and economy. It sustains Kent reputation. Let the manufacturers tell you more about it. Write for catalog and prices.

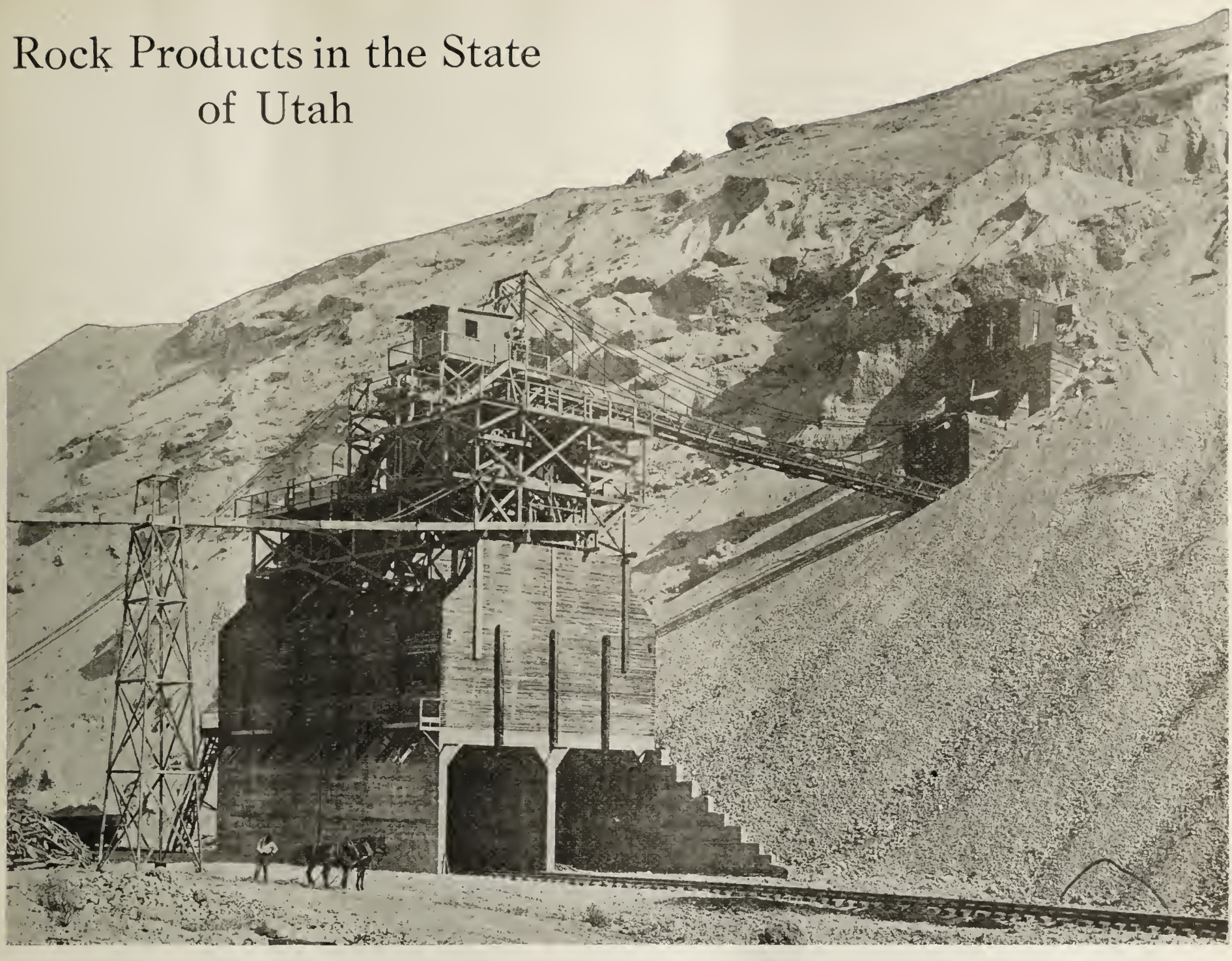
Placing Concrete Membrane Lining in Herron Hill Reservoir

Continuous Sheet Two Inches Thick Applied by Cement Gun to Stop Leakage—High Rates of Progress

Because of costly leakage of water from a high-service water-supply reservoir on Herron Hill, Pittsburgh, Pa., a concrete membrane lining is being placed in the reservoir by cement-gun deposition on a double layer of mesh reinforcement. A lining of the more common type, consisting of two layers of concrete molded in separate slabs, with bituminous waterproofing between the layers, was contemplated at first, but after careful study of the case the decision was reached that a thin reinforced cement-gun lining without waterproofing and without expansion joints would be entirely adequate for the service, and the work is being carried out accordingly.

Estimates made on both types of lining in spring of this year indicated that the cost would be approximately $125,000 for the two-layer lining with waterproofing, and $55,000 for a continuous cement-gun lining, a difference in favor of the latter of about $70,000. In case the thin lining should develop objectionable cracks, against all expectation, it would still serve as the lower layer of a waterproofing concrete lining laid in blocks, and proper credit for such use would make the net loss due to the construction of the gunite lining in the first place not more than $8,000. The prospect of a gain of $70,000 as against a rather remote chance of losing $8,000 was an important consideration in the final decision.

Rock Products in the State of Utah



General View of Utah Sand & Gravel Company's plant.

The production of rock products in the western states during the past few years has rapidly grown from an infant industry to its present position of rank among the most prominent of the western industries.

As a result of past years of experience in road building and concrete construction in many lines of private and public endeavor, architects and engineers are insisting upon more rigid specification and inspection of materials that go into the construction of modern buildings, bridges and highways than has been their practice in the past. The material that enters into the composition of concrete foundations of buildings, walls, bridges and hard surfaced roadways must not only be of the best obtainable but its preparation for the market must be carefully and thoroughly made to meet those requirements. In the service of the modern highway, the pavement must necessary withstand the shock and wear of heavy traffic, and the desired results can only be assured with the use of properly prepared materials.

To meet these requirements the purveyor of sand, gravel and crushed rock has been compelled to abandon the old method of hauling his material direct from the point of supply to the building site. He must now screen his sand and gravel to meet specified size requirements; he must wash these products to remove silt, vegetable and any other deleterious matter with which they may be mixed in order that the structure into which they enter may suffer no disintegration that may be caused by the presence of such detrimental foreign matter.

Realizing the force of the new order and the rapidly growing demand for material to meet its requirements, Ryberg Bros., Contractors of Salt Lake City, became active in the organization of the Utah Sand & Gravel Co., a corporation promoted for the purpose of erecting and operating a plant that should meet every demand of quality and quantity within the range of its operating capacity.

This plant is now in full operation turning out products that are meeting every requirement and arrangement is pronounced by many competent authorities to be the most complete plant of its kind to be found in the west.

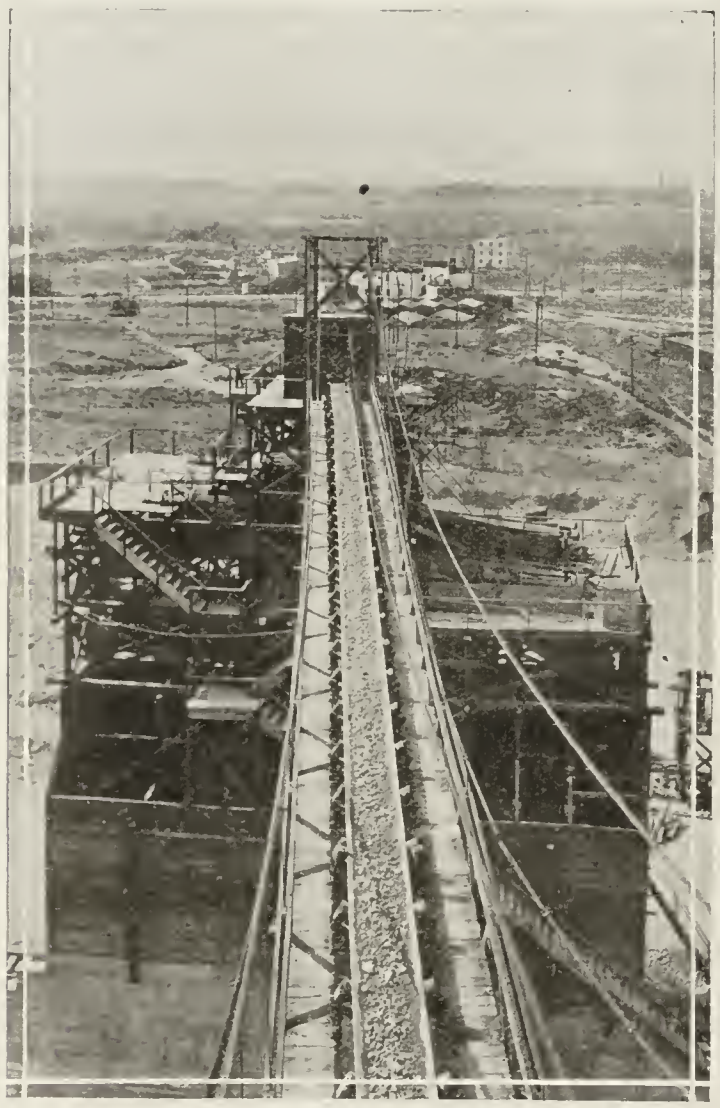
The site selected is ideal. Situated within the city limits and provided with track connection with three trunk lines and two electric railroads, the plant is located at the base of a spur of the Wasatch Range of mountains whose western slopes are marked by three great benches which represent the different periods of inundation of what is known in geologic history as Lake Bonneville and now more familiarly known as Great Salt Lake. As the waters of this inland sea receded by periods they left upon these benches great deposits of sand and gravel, the residue of erosion caused by wave action covering unknown periods of time.

The deposit consists of clean sand and gravel which is capped with very little earth overburden that ranges in depth up to fourteen inches. There are areas of large size with no overburden whatsoever. The gravel in this deposit is small in size, 75 per cent of which runs under two inches. The property at this particular plant consists of approximately eighty acres on the bluff and about ten acres of flat ground at the lower level, which is about seven hundred feet below the plateau.

From a portion of these deposits the Utah Sand & Gravel Co. secures the raw material which is delivered to the crusher house below by means of a 100-horsepower Green (Arrow) drag line scraper.

The aggregate passes over a bar grizzly arranged with 2-inch openings, the oversize going to Symons disc crushers set to crush to a 1½-inch ring. The combined products of grizzly and crushers drops on to 24-inch Diamond belt conveyor, one hundred eighty-seven feet long, suspended by cables and terminating at the receiving and distributing house at the top of the screening and washing plant which is constructed in two units; one side for dry screening and the opposite side for washing.

The dry side is equipped with two 42-inch by 14-foot three-section No. 9 standard revolving screens. The wet or washing side is equipped with six standard No. 1 washing screens 36 by 52¾ by 72 inches. The through size product of these screens with its volume of water flows by gravity to hydraulic classifiers; the spigot product of these classifiers drops to the receiving tanks of two drag classifying and dewatering machines. The hydraulic classifiers eliminate all vegetable, silt and other reject matter; they are also used to classify the sands in



Belt Conveyor (Diamond Rubber Belt used) in operation.

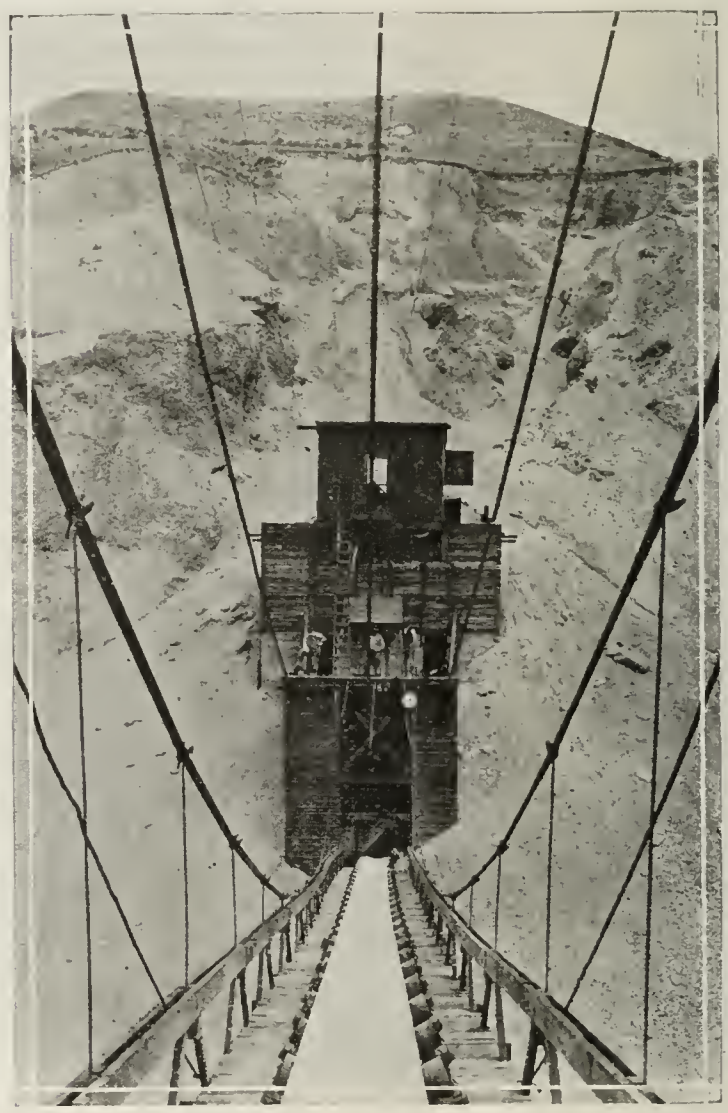
regard to sizes when required. The drags function as dewatering machines.

The assorted products drop into the storage bins below, ready for loading into railroad cars that pass underneath or into trucks that are loaded from chutes at the side.

Salt Lake City proper is approximately three and one-half miles south of the Utah Sand & Gravel plant, and a hard road passes within one-quarter of a mile of the company's site. The city market is being supplied by team and automobile truck and also by carload shipments which are transported over steam and electric roads. The vicinity within a two hundred mile radius of Salt Lake City served by three steam railroads and three electric lines is supplied with the products of this company.

These products are shipped throughout this district for the various purposes of road work, building, concrete construction, railway engine sand, etc.

The equipment was furnished by the Stephens-Adamson Mfg. Co. of Aurora, Ill., through their Salt Lake



The wire rope arrangement for suspending the Belt Conveyor. Leschen & Sons' Rope used.

City representatives, Messrs. Gates & Glassbrook, who prepared the plans and were ably assisted by Mr. H. R. Sadd, Secretary of the Utah Sand & Gravel Co., who supervised the structural design and erection and has charge of plant operation.

The officers of the company are:

H. E. Hatch—President.
E. W. Ryberg—Vice-President and General Manager.
Frank Pingree—Treasurer.
H. R. Sadd——Secretary.
W. E. Ryberg—Director.
A. L. Hoppaugh—Director.

The State of Utah now has two hundred miles of bithulitic and concrete highway, approximately one hundred seventy-five miles having been laid during the past two years; and if present plans are carried out the year 1921 will witness the construction of nearly an equal amount. What is also quite interesting and important is the fact that the materials for this notable public improvement were provided exclusively from Utah's great storehouses of natural resources.

Concrete Catch Basins

Manholes and catch basins in Eau Claire, Wis., will hereafter be constructed of concrete instead of brick owing to high cost of brick and labor in their construction. It is believed that a saving of fifty per cent in the construction of manholes and catch basins can be effected by the substitution of concrete.

The Big-Hole Drill an Economic Factor

In all the range of recent quarry improvements perhaps there is none more radical or more valuable than that of the recently developed practice of drilling big holes with well drills for the shooting of big shots, and so diminishing the danger of blasting to a minimum, while at the same time the efficiency of the initial explosive is developed to its highest attainment. Naturally the big-hole drill is most efficacious where the quarry face can be worked in a long straight stretch. The holes are sometimes put as far back as 35 or 40 feet from the working face and no man is able yet to state what will be the maximum limit of the charge that shall be placed in the big blast holes. Of course, every practical man knows that the ideal proposition in blasting is to lift the stone, partially turn it over and drop it again so that it is in fit condition to be reclaimed by a steam shovel. Just to topple over the face of the quarry or roll it out is not enough. The shot must be so placed and so designed as to raise the lift and drop it again so as to shatter and break up the rock as much as possible, and the lower down this can be done the less danger there is from flying spawls, which always come from the top of the dead rock.

The machines now in use making big holes for blasting purposes were first designed as well drills and they have been adapted to the use of the quarries by changing the bits slightly and placing the machine on rollers, so that it can be moved conveniently on the top ledge of rock after the stripping has been scraped off. Some operators claim that a diameter of five inches is all-sufficient for the heaviest type of blasting, although some others are now experimenting with blast holes as large as eight inches in diameter. The end of this study is not yet, for the economic value of explosives and the detonating of it in such large quantities as go to make up the start of big-hole blasts has not been worked out perfectly by the explosive people. We do know, however, that a majority of the biggest quarry operators are using big-hole drills, each according to his own system and with practice that has been developed by his own conservative observation, which are giving great results in an economic way.

Just as soon as the explosive people are ready to announce dependable working data with recommended practice on the subject of big-hole blasting there will be no other way for any considerable quarry operation to be conducted except by the use of big-hole drills. There are several drills which have already made a good record in this direction and in general the principles of a well-drilling machine are admirably adapted for this work. The quarryman, of course, is not interested particularly in the first cost of his big-hole drilling; what he wants to be shown is the cost per foot of drill holes as put down in his quarry operations.

If the quarryman can cut his total drilling expense in half with any given machine, that is what he is looking for. The machine which gives the greatest economy is naturally the one that will attract the attention of the purchaser sooner than any other. The gasoline engine and the electric motor have both been used successfully for driving big-hole drills. It is probable that the gasoline engine is adapted for use in the larger number of quarries, because the feed line of electric juice is more or less a permanent installation, while the big-hole drillers are now being made with direct-connected gasoline engines.

Aside from all of the economy introduced by the use of the big-hole drills and the elimination of danger by reducing the number of shots fired in a year's operation, the big-hole drill has another advantage, and that is the elimination of a large labor factor in the drilling department and passing it over to an operation which is conducted by machinery. As the number of available men

View of a Pennsylvania quarry, showing a Sanderson Cyclone Drill, in operation.

for quarry work grows less and less, the attractiveness of the machine-driven operations in the quarries becomes most important, and in this the big-hole drill attains possibly its greatest advantage. With one man, or two at the most, working a big-hole drill, as much actual tonnage of rock can be shot off the face as if a gang of four or six drillers were kept at work constantly.

We recall the time when every quarry operation looked like a little army of men in the quarry pit, whilst today in every considerable quarry operation we see a vast amount of labor-saving equipment, such as trucks, locomotives, steam shovels and conveyors of every type, and each of these machines operated by an expert workman, so that the army has been reduced to a few dozen men, at the most, while the output has been increased in many cases 25 or 30 times what it used to be when the little army of sledgers and wheelbarrow men were loading the elevator by hand and when the drilling was done with little bits from a tripod and the shooting was done from just as many holes as there were men. So, the big-hole drill is an expected improvement along the line that has already been prefaced for it by other developments of machinery now indispensable in every quarry operation.

Proper Handling of Lump Lime

Lime is one of the most useful building materials. Its uses are many, and in one form or another it enters into nearly every type of construction. The history of its development and manufacture is very interesting, and the details of many of the processes through which it passes are fascinating.

What actually takes place when lump lime is slaked? Many men who use lime have studied it carefully and know from experience just how to obtain the best results. There are others, however, who merely know lime as a substance, which, when water is added, slakes and forms a paste.

Heat Generated by Slaking

When quicklime, which is the product resulting from burning raw limestone, is placed in contact with water, they unite, and a chemical change takes place. Considerable heat is given off during this process and the proper regulation of this heat is necessary in order to obtain the best lime paste. Certain types of lime give off more heat than others, and these limes should be carefully watched to see that they do not "burn." Other limes are much slower slaking, and when working them care should be taken to see that too much water is not added, for they will "drown."

Exercise Care in Adding Water

When using a quick-slaking lime, if insufficient water is added, the paste is not as plastic and works short. It feels slightly gritty, and has a yellowish tinge. The temperature of the mass is raised considerably above the boiling point, and a new chemical reaction takes place. This results in a formation of a substance which absorbs carbon dioxide at a rapid rate, and thus hardens before it may be used. Chemists have not been able to determine exactly what the new compound is, but the result is well known by many of those who use lime. In the case of "drowned" lime, however, the excess of water has absorbed too rapidly the heat required for slaking, and the change from the quicklime to the paste is retarded. When the paste is formed it is thin and watery and not satisfactory to use.

Good Mortar Man Important

The man who slakes lump lime on the job has an important duty. He can produce an excellent material, smooth and fat, by taking pains to see that each batch is handled properly. Some of the larger contractors keep a man on their pay roll who has no other work than that of slaking lime and tending to the preparation of the mortar and plaster. He is an expert in his work, and is rated as such.

A good lime putty, properly prepared and allowed to age or soak for some time previous to its use, makes a mortar or plaster that is easy to apply. Ageing the paste imparts to it a degree of smoothness that cannot be otherwise obtained. The men who work with it are better satisfied and work more efficiently, and consequently obtain better results. Thus it is seen that the man with the hoe plays an important part in modern construction work. The Kent Machine Co., 130 Second Ave., Kent, O., have invented a very efficient and practical machine for mixing mortar and plaster. The Kent mixer is being used by thousands of contractors and builders all over the country and pays for itself on the first job.

Does the Work Automatically

The Kent Continuous mixer operates entirely by itself. Unlike batch mixers, it requires no man labor beyond the loading operation.

Keep the hoppers filled with sand and cement and the Kent automatically will serve to your block machine's charging platform a continuous stream of perfectly mixed and moistened material.

To keep the hoppers filled, most users of Kent machines construct big wood or metal bins over the hoppers. With the bins filled the mixer will run on by itself for hours, requiring no attention whatsoever, and giving the man labor in the plant an opportunity to spend all the time on actual block molding.

There is no complicated mechanism in Kent Continuous Mixers. They are built simply and sturdily. Gray cast iron and high grade steel are the materials used. They have lasted through day after day service for over fifteen years. All parts subject to wear are removable and can be readily replaced. Bearings are all self-aligning and interchangeable. The patent feed plates are equipped with removable wearing strips and are positively guaranteed to accurately measure the cement and sand or gravel. Mixing paddles are cast on chills and are hard and durable. If they do wear, they can be replaced one at a time as each one is fastened to shaft by a single bolt and nut.

Two men in a Kent equipped plant (one to run molding machine and tamper and one to carry green blocks away) can turn out over 800 standard blocks in an eight-hour day. Truly the Kent only will permit of such economy of labor and time.

With the price of man labor mounting and the need for extra high production in all manufacturing lines, these distinctive features of the Kent ought to interest concrete block and tile manufacturers.

Write the Kent Machine Co., Kent, Ohio, for their new catalog No. 8, giving detailed description of all sizes and models of Kent Mixers.

Distribution and Profits in Handling Cement

"Probably nothing will cause the retail lumberman to sit up and pay attention quicker than a discussion of the cement distributing problem and whether dealers are securing a reasonable profit writes the *American Lumberman*. To say that retail lumbermen generally have been dissatisfied with the cement situation is perhaps putting it rather mildly. The situation is well covered by A. L. Porter, secretary Western Retail Lumbermen's Association, in a paper he prepared for presentation at the recent annual of the association held in Fresno, Calif. On distribution and profits in cement Mr. Porter said:

"The sausages you sent me had meat at one end and sawdust in the other end," said the lady to the butcher. "Yes, ma'am," replied the butcher; "these hard times it is very hard to make both ends meat." From what retailers have told us about the cement business we take it for granted that if they were honest in applying anything like their cost of doing business to the cement side line they handle it would be more difficult to make both ends meet.

Retailer Should Ask for Fairer Deal

The attitude of the retail building material merchant toward the cement business these days should be a good deal like the hen when she found the farmer had put a number of baked clay eggs in the nest. She promptly kicked them out and said, "You can't make a bricklayer out of me." The cement folks for a long time have endeavored to make, and we believe have succeeded to a great extent in making, a financial monkey out of the retailer. Said retailer has kicked and complained a great deal, just like folks complain about the weather, but as Mark Twain says, "Nothing has ever been done about it." We should all remember that there is many a good thing lost by not asking for it. Probably if we retailers would ask the cement folks for just what we want, and stick to it, we'd be agreeably surprised.

Cement Is Usually Handled at a Loss

The retail building material merchants of this country have millions upon millions of dollars invested in their lumber stores and retail yards. The cement folks have used the retailer's place of business, with his enormous investment and overhead, as a distributing agency for their cement without paying anything like proper remuneration for the privilege or the service rendered by the retailer in marketing their products. This enomous investment of millions is maintained chiefly by lumber and its products. The overhead expense of maintaining and operating a retail building material business, including a normal profit of between 6 and 10 per cent on the investment, will average somewhere between 25 per cent on the sales, or 33⅓ per cent on the cost of the merchandise. With few exceptions the cement end of the retail building material business constantly represents an actual loss to the retailer. Ten or twenty cents a barrel on cement is just a little handout—a bunch of salve that does not heal or cure.

Every Commodity Should Pay Its Way

Our thought is that every line of merchandise handled through a retail building material yard or store should stand its just and equitable proportion of the cost of doing business. If that cost is 25 per cent on the sale price, or 33 1/3 per cent on the cost price of the goods, that percentage should be added to the commodity and the total should be the retail price secured by the merchant. To illustrate: If cement costs the retailer $3 a barrel, and if his cost of doing business, including a just and earned profit on his investment, is 33⅓ per cent on the cost of the merchandise, then he should retail that cement at $4 a barrel. If he sells it for any less he is losing money and charging just that much more to lumber and its allied products.

Margin Allowed Is Ridiculously Small

We recently had the pleasure of reading a letter written by a large line-yard concern to a cement manufacturer. It sets forth the cement question from the retailer's standpoint in most illuminating fashion and is as follows:

Gentlemen:

"That you may not misunderstand our policy as stated to you in recent conversation in our office and later over the 'phone, I am writing you this letter.

Protests Against Direct to Consumer Sales

"First: We will not buy goods from any manufacturer, wholesaler, jobber or broker who sells goods or quotes prices to the consumer. We believe that the retail dealer who carries for the twelve months in the year a stock of goods that will meet the demands and requirements of his trade should not be forced to compete with the manufacturer or wholesaler: Who is not interested in the community; pays no taxes in the town or the county; spends no money with the merchants or the farmers or for labor; donates nothing for good roads, the building and maintenance of churches, for charitable purposes, entertainments etc.

Commission Practice Destroys Standards

"Second: We will not buy goods from any manufacturer, wholesaler, jobber or broker who continues to sell to merchants who make a practice of selling goods on commission or at a small margin that will not pay legitimate expenses and give them a fair return on invested capital and for their services. The merchant who sells his goods for a price that does not pay his expenses and leave him a legitimate profit on his investment is a disturbing factor and makes impossible good standards in business, and neither is the consuming public benefited by unbusinesslike methods of distribution, for the losses must be paid by the consumer eventually. The successful manufacturer and merchant must include in his expense for doing business a percentage to cover losses; therefore such competition must involve cost to the consumer that outweighs any benefits.

Contractor Sales Should Bear Full Profits

"Third: We do not believe that the purchaser of $1,000 worth or more of material is entitled to a lower price than the purchaser of $10 worth, except a reduction for any saving in the expense of handling, and no more. The retailer is entitled to the same net profit a sack for every sack he sells. The contractor who buys two thousand barrels of cement and employs fifty or two hundred men pays the same wage scale as the contractor who buys only ten barrels and employs only one or two men. The contractor who ships one hundred carloads pays the same freight as the shipper of one car load of the same commodity. This is the ruling made by the Federal Government regarding railroad and water freight rates; otherwise it is discrimination against the small shipper and would tend to give a monopoly to the larger shipper. You expect and get the same price a sack on large business sold direct to contractors, with the local dealer guaranteeing the account and collecting it for

the absurd figure of 3 per cent, which you expect to get on business which can only be sold in small lots and which in consequence has to be sold through the dealer. The compensation the retail dealer is entitled to ask for taking care of small and difficult trade is that we have all the trade. The builder or owner is not benefited, and should not be; but the profit that belongs to the retail dealer is given to the contractor and, while you are pretending to be the friend of the retailer, you are helping to take from him his legitimate profit and give it to the contractor. You give no credit to the retail dealer for creating a demand for cement by his talking, recommending and advertising it in the newspaper and through other channels.

Should Correct Evil That Hurts Retailer

"Your pretenses of friendship for the retailer are highly absurd and ridiculous. You have two uses only for the retail dealer and you use him for both: First, you use him to distribute your product to the small consumer, as you can not do so profitably; second, you use him to guarantee and collect the payment from the carload consumer, for which you allow him the sum of 10 cents a barrel—not a fair profit. Why do you not assist in correcting this evil instead of pursuing your old policies and perpetuating it? The falsity of this 10 cents a barrel is illustrated by the fact that it was 10 cents a barrel three years ago and is 10 cents today, when the investment required to handle the business is nearly three times what it was then and the costs of doing business are double. You know that if the product of all the cement manufacturers is marketed on a margin of 10 cents a barrel by the retail dealer you would soon be looking for a new class of distributers, for the old ones would all be bankrupt unless they had another source of income out of which to pay the losses they sustained handling your product.

Can Not Be Handled on 10-Cent Margin

"Is it fair for the manufacturer of the other products that their product should bear an additional cost to the consumer to cover the loss sustained in handling your product? If the manufacturers of lumber and other products would adopt your methods and every time a consumer wanted a carload of material they would quote him a price that would allow a commission of, say, 3 per cent to the retail dealer, you know that it would mean the elimination of the retail dealer. But, do you believe that society would be benefited? That the consumer would profit? Where would he go for a bunch of shingles to repair a leaking roof, the material for a granary or for an addition to his house or for a sack of cement to repair his cistern? There would be only one place to go and that would be to the factory and to the mill and he would have to pay the local freight rates and await the delivery by local freight. You give as your excuse for quoting a profit of 10 cents per barrel that another cement company was going to make the same price. That concern says the reason it quoted 10 cents a barrel was because you did; you courteously return the favor and you hide behind one another. We will admit that the fault is not entirely yours and that if some retailers were not tempted by the glamor of a few dollars made at the rate of 10 cents a barrel this evil would not exist; but if you are sincere in correcting it you can assist and make it impossible. But you have got to have the courage to make your price and stand by it; choose betwen the retailer who demands what he is entitled to and the dealer who is willing to sell his self-respect for 10 cents a barrel and quit hiding behind one another and trying to convince us that two wrongs make a right."

Should Have 20 Per Cent on All Sales Financed

It seems to me that if cement is to be quoted and sold direct to others than regular dealers and the dealer is expected to finance the shipment and stand good for the payment when a sale is made, a very different arrangement than for a few cents a barrel margin should be made in order properly to compensate the retailer.

Our thought is that on all shipments the dealer is expected to finance he should have a trade discount of at least 20 per cent, and that so far as local consumption is concerned—that is, anything less than a number of carloads, which would be unloaded direct on the job—the dealer should have 100 per cent dealer distribution, the same as he has in other lines.

Drill Sharpeners and Air Compressor Bulletins

The latest bulletins issued by the Sullivan Machinery Company, 418 Gas Building, Chicago, are all of interest to the stone industry. No 72-E is devoted to the Sullivan Drill Sharpeners, compressed-air machines for making rock drills and hammer drill bits by hammering. They pay for themselves in a short time by their rapidity of operation, economy of labor, and uniformity of product. Bits so turned out are perfect in shape and of the exact gauges called for Even if only two or three rock drills or hammer drills are in regular use the installation of a sharpener is fully wararnted. No. 77-A describes the Sullivan Portable Mine-Car Aid Compressor, which were introduced a dozen years ago and are finding a constantly increasing scope. They are specially suited for any work above or below ground in which a little air is required at widely separated points and for relatively brief periods. No. 77-B is devoted to Sullivan Angle-Compound Power-Driven Air Compressors. These are in use today in all parts of the world and under a multitude of conditions in quarries and mines, and in various industrial plants. They have proved to be remarkably efficient, convenient, and reliable. All of the bulletins are fully illustrated. Copies of them may be had for the asking.

Forty Tons Pressure for Making Brick and Blocks

Helm Brick Machine Co., 762 Mitchell street, Cadillac, Mich., has recently issued a 52-page catalog that will undoubtedly prove of great interest to all concrete products manufacturers. Although it very fully describes and illustrates the well known Helm press, it is far more than a catalog. The first half of the book is given over to a practical explanation of the correct methods of manufacturing concrete block and brick. Plans of an ideal plant for the manufacture of these products are presented. The Helm dry wall system is fully demonstrated. In this type of construction the wall is double. No concrete bond obstructs this air space at any point. Rough blocks are used for the inner course and a block with a richer facing applied for the outer course. Further information and catalog may be obtained from the manufacturer.

High Speed Concrete Road Construction

Radical changes in material handling methods, relative to road construction work, have been made during the past year. A very good example of a new method, differing from the customary ways of handling this class of work, is illustrated by the accompanying photograph. This arrangemet has proven highly successful, and it requires only a small investment for some additional equipment to a road contractor's plant.

There was an interval following the war when contractors hesitated to submit complete contract prices on new proposals, principally on account of the uncertainties of the labor situation. However, to remain in business, and be in a position to meet competitive bidding, all contractors soon recognized, that unless some fundamental innovation rose up on the old order of things, it would prove utterly profitless to attempt bidding for new work.

It seems but a short time since certain improved labor saving machines were placed on the market, nevertheless, even though some engineers may have quickly perceived their possibilities, the final successful combination of these particular machines, as applied to actual road construction, was a step by step process. Not until the ingenuity of a few practical engineering contractors demonstrated how nicely the results of these new machines dove-tailed with one another, did there appear again a hopeful prospect of good profits from road work.

The new scheme for surmounting the labor costs, for increasing the output, and for obtaining the highest efficiency from a contractor's present mechanical equipment, rests upon a combination comprising three distinct types of machines. Each one of these three mechanical therefore, has increased its value, because of its indispensableness to the complete success of this new money

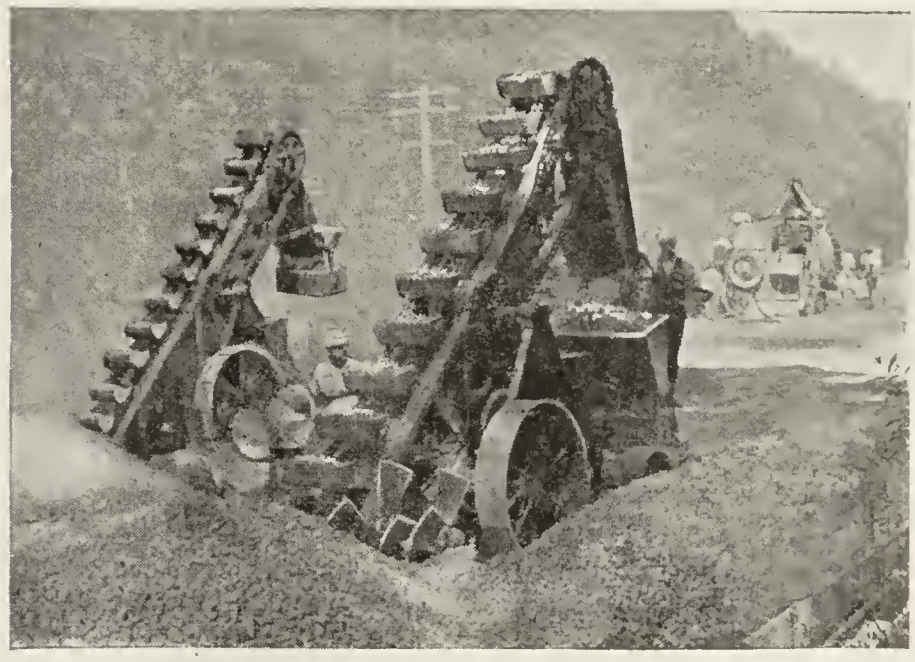
making combination. As may be noted in the illustration, one of the machines is a self-propelled, self-feeding and self-crowning "path digging" wagon loader; another is a tructractor, and the third is a self-propelled concrete mixer for road paving. Leaving out anyone of these machines would quickly raise the cost per cu. yd. of concrete spread on the roadway. Attempting such illogical economy would be like trying to win a race in an automobile minus its pneumatic tires.

The photograph is of a section on the new Bronx Parkway, under construction from the northern end of Bronx Park in New York City, to the Kensico Reservoir at Valhalla, in Westchester County, N. Y., a total length of 16 miles. This beautiful driveway skirts along the banks of the little Bronx River, through a picturesque valley.

The road contractor is the Hastings Pavement Co. About one mile from the construction work the contractor obtains the necessary sand. This material is automatically loaded at the rate of 5 cu. yds. in 5 minutes, into a number of auto trucks by means of a wagon loader. Two similar type loaders may be seen operating on the new road; one digs sand and fills a measuring box, and on the opposite side, the other digs crushed stone, also filling a measuring hopper. Beyond the loaders are two concrete mixers, and running between these two sets of labor saving machinery are three tructractors.

The sand and stone piles, dumped along either side of the road, are of such amounts that when they are dug away, a clear space, averaging 50 feet, is always maintained between the sand loader and the line of mixers, while on the other side a space of 75 feet is left open. By this arrangement, the tructractors, after receiving their measure of sand, avoid getting into each other's way when they steer over to the stone loader. Filled with material, the tructractors then shoots up to the first concrete mixer waiting with its power loader down for a fresh charge. At the same moment that the tructractor dump-body discharges, a laborer empties a bag of cement in with the dry aggregate, and almost the next instant this material is sliding from the uplifted charging scoop into the revolving mixing barrel, and finally, the wet mix drops from the end of a long swivel spout to the road.

The observed speed of each tructractor was 1 minute



Machines digging and loading gravel and crushed stone.

for a round trip with ½ cu. yd. of material. Therefore, the three tructractors deliver 1½ cu. yds. in 1 minute to the two concrete mixers, or ¾ cu. yd. in 1 minute to each mixer. As to the number of laborers actually required: thre for the two loaders, three for the three tructractors, two cement men, and ten men for the two mixer gangs; thus making a total of 18 laborers.

It should be remembered that all the machines in this outfit are self-propelled, and that the buckets on the wagon loaders are filled automatically, and that a path is cleaned up ahead of the loader wheels, all by the means of the patented, self-feeding propeller blades. Laying a a road foundation at this speed means an immense saving in wages and time.

William Danmar of Jamaica, N. Y., is an artificial stone manufacturer who has made an unusual success with the manufacture of concrete garden furniture. He also makes a specialty of decorative stone work for use in mantels, fireplaces and exterior building trims.

Factory Gearing

By A. O. Gates, Engineer of Materials Handling Division, Dodge Sales and Engineering Co.

Who selects the gears for special equipment about the factory, and upon what basis is the selection made?

One sees the variety of gearing used; the startling differences in the selections made by different designers for the same apparent duty; the variation in numbers of teeth, faces and bores, and not much consistency; the delay in getting gears out of the foundry and machine shop; the great lists in the catalogs of the manufacturers who really attempt to serve this demand; the occasional disappointment of the operator who expects to receive a cataloged gear immediately; the expense involved in keeping a large stock of patterns in repair; all the thousand and one variations of the gear business make one wonder if there is not some way in which the gear-using public—and that means all industry—can be gotten together to use gears that could be carried in stock, as pulleys are today, by a thousand dealers and manufacturers.

Back in the eighties, a shrewd factory engineer by the name of Lewis, employed by one of the larger and more progressive manufacturers of the country, took time out and made a study of the gearing game. He took account of the materials involved, the strength of the shape used for gear teeth, the effect of speed, and of wear. He produced a formula which is known by his name, Lewis' Formula, which is the basis of practically all gear calculations today. It is not a single formula, there are some intricacies, but it appears to give satisfactory results. If it is not wholly correct, only an elaborate investigation at an enormous expense would bring us nearer to the truth. (See any handbook for Lewis' Formula.)

Since Lewis' work, and in the last twenty years particularly, certain advances in mechanical transmission standards have been accepted generally, without much recognition of the great advantages they have given to industry. The standardized interchangeable systems of pulleys, hangers, bearings, etc., is referred to. A fair sized shafting equipment, fully equal to the requirements, can be obtained promptly made up from stock material, at points all over the country.

With pulleys, a number of machines are served from a single lineshaft, each pulley transmitting but a portion of the total power. Because shafting sizes vary with the power transmitted, the pulleys must fit the shaft, and it is here that the use of interchangeable bushings which fill the space between the standardized bores of the pulleys and the diameter of the shaft comes in; this interchangeable bushing system for pulleys is what has revolutionized mechanical power transmission.

The principles of standardization and interchangeability can be equally applied to gears, but in a somewhat different manner from the applications to pulleys. First it must be recognized that about 95 per cent of the applications of gearing involve cases where the *whole of the power* is transmitted both by the shaft and by the gear.

For this case, then, it is necessary to make the gear and shaft equal in those qualities required for equal power transmission. This is a rather simple matter; involving consideration of the average form in which gearing is installed, and the engineering calculations for both the shaft and the gear.

A common gear transmission has the *gear overhung* on one end of the shaft. If for a given gear, a shaft be calculated on this basis, this shaft will care for the stresses set up in the shaft when the gear is between bearings at a center distance four times the distance from the center of bearing to center of overhung gear; with the gear off center, the span between bearings may be a little greater; in fact, applying a general rule to keep pulleys and gears close to bearings, most any reasonable span between bearings will give a safe working condition.

In the tables shown the shafts have been figured for cast iron gears on the above basis.

	Teeth	Pitch Diam.	Bore	Hub Length	At 250 F.P.M. R.P.M.	At 250 F.P.M. H.P.	At 500 F.P.M. R.P.M.	At 500 F.P.M. H.P.	Static Pull
¾" circular pitch	12	2.86	1 3/16	...	330	....	665	....	450
	15	3.58	1 3/16	...	270	2.5	540	3.8	500
	17	4.06	1 3/16	...	235	2.6	470	3.9	515
	20	4.77	1 3/16	...	200	2.7	400	4.2	545
	28	6.69	1 7/16	2¼	143	3.1	286	4.7	610
	40	9.55	1 7/16	2½	100	3.4	200	5.1	675
	55	13.13	1 11/16	2½	71	3.6	142	5.5	725
	68	16.23	1 11/16	2¾	58	3.8	116	5.7	750
	80	19.10	1 11/16	2¾	50	3.9	100	5.9	770
	96	22.92	1 15/16	3	41	3.9	83	6.0	790
	113	26.98	1 15/16	3¼	36	4.0	72	6.1	810
1" circular pitch	12	3.82	1 7/16	...	...	....	...	....	760
	15	4.77	1 7/16	...	202	4.2	404	6.4	840
	17	5.41	1 11/16	...	177	4.3	354	6.6	865
	20	6.37	1 11/16	...	152	4.6	304	6.9	910
	28	8.91	1 15/16	2¾	107	5.1	214	7.8	1030
	40	12.73	1 15/16	3	77	5.6	153	8.5	1130
	55	17.51	1 15/16	3¼	54	6.1	108	9.2	1210
	68	21.17	1 15/16	3½	45	6.2	90	9.5	1250
	80	25.46	2 3/16	3¾	38	6.4	76	9.8	1290
	96	30.56	2 3/16	4	31	6.6	62	10.1	1330
	112	35.65	2 7/16	4¼	27	6.7	54	10.3	1350
1¼" circular pitch	12	4.77	1 11/16	...	200	....	400	....	1340
	15	5.97	1 15/16	...	165	7.4	330	11.1	1470
	17	6.96	1 15/16	...	145	7.6	290	11.5	1510
	20	7.96	2 3/16	...	125	8.0	248	12.1	1600
	28	11.14	2 3/16	3¾	88	7.7	175	11.7	1540
	40	15.92	2 7/16	4	62	8.4	124	12.9	1690
	56	22.28	2 7/16	4¼	43	9.1	87	13.9	1820
	68	27.06	2 7/16	4½	36	9.4	71	14.3	1880
	80	31.83	2 7/16	4¾	30	9.7	61	14.7	1940
	96	38.20	2 15/16	5	25	10.0	51	15.1	1990
	112	44.56	2 15/16	5½	22	10.2	43	15.5	2030
1½" circular pitch	12	5.73	2 7/16	...	167	....	335	....	2300
	15	7.16	2 7/16	...	135	12.6	270	19.1	2520
	17	8.12	2 7/16	...	122	13.0	245	19.6	2600
	20	9.55	2 15/16	...	104	12.3	208	18.7	2460
	28	13.37	2 15/16	4½	74	13.9	149	21.0	2770
	40	19.10	2 15/16	4½	51	13.5	102	19.9	2700
	56	26.74	2 15/16	5	38	14.6	76	21.5	2900
	68	32.47	2 15/16	5¼	30	15.0	60	22.2	3000
	80	38.20	3 7/16	5½	25	15.5	50	22.8	3090
	96	45.84	3 7/16	6	21	16.0	42	23.5	3180
	112	53.47	3 7/16	6¼	18	16.2	37	23.9	3240
1¾" circular pitch	12	6.68	2 7/16	...	143	....	285	....	3000
	15	8.36	2 15/16	...	115	16.1	230	24.8	3250
	17	9.47	2 15/16	...	100	16.7	200	25.5	3350
	20	11.14	2 15/16	...	85	17.6	170	27.0	3550
	27	15.03	3 7/16	5¼	61	17.9	122	27.3	3640
	40	22.38	3 7/16	5½	42	19.8	84	30.3	3960
	56	31.19	3 15/16	6	30	21.6	60	32.8	4280
	68	37.88	3 15/16	6¼	25	22.1	50	33.6	4420
	80	44.56	3 15/16	6¾	22	22.7	45	34.6	4700
	96	53.47	4 7/16	7	18	23.4	36	35.4	4680
	112	62.39	4 7/16	7½	15	23.7	30	36.4	4770
2" circular pitch	12	7.64	2 15/16	...	125	....	250	....	3660
	15	9.55	2 15/16	...	104	21.1	208	30.6	4020
	17	10.82	3 7/16	...	91	20.7	182	31.6	4140
	20	12.73	3 7/16	...	78	21.9	155	33.4	4390
	28	17.82	3 15/16	5¾	55	22.6	111	34.4	4500
	40	25.46	3 15/16	6¼	38	24.7	77	37.8	4950
	56	35.65	4 7/16	6¾	27	26.7	55	40.6	5320
	68	43.29	4 7/16	7	22	27.5	45	41.8	5500
	80	50.93	4 7/16	7½	19	28.3	38	43.2	5660
	96	59.84	4 15/16	8	16	29.0	32	44.4	5750
	111	70.66	4 15/16	8½	13½	29.4	27	45.3	5870

R. P. M.'s of Follower at 100 R. P. M. of Driver.

Driver \ Follower	Teeth	15	17	20	28	40	56	68	80	96	112
	15	100	88	75	54	38	27	22	19	16	13
	17	113	100	85	61	43	30	25	21	18	15
	20	133	118	100	72	50	36	30	25	21	18
	28	187	165	140	100	70	50	41	35	29	25
	40	267	235	200	143	100	72	59	50	42	36
	56	373	330	280	200	140	100	81	70	58	50
	68	453	400	340	243	170	122	100	85	71	60
	80	533	470	400	285	200	143	120	100	83	71
	96	640	570	480	343	240	171	142	120	100	86
	112	747	658	560	400	280	200	165	140	116	100

In the tables shown it will be noted that we have limited ourselves to certain numbers of teeth, to certain circular pitches, and that the bores are only those standard transmissions shaft sizes as recommended by a committee of the A. S. M. E. Furthermore, it has been found that ordinary gear transmissions involve rim speeds between 100 and 600 feet per minute, and so our tables give the horsepowers for speeds of 250 and 500 f. p. m., with corresponding r. p. m.'s, which should make easy calculations for other r. p. m.'s.

No ordinary power transmission problem involves an exact amount of power, there are too many variables. If the gear is large enough, it will do the work. By selecting gearing with increases in power transmitting strength by 50 to 75 per cent, and using standard and commonly used pitches of gear teeth, we get a line of gears capable of all reasonable powers and increasing by such sizes as involve the use of standard shafting sizes which likewise increase with the pitch and numbers of teeth.

Who or what determines the number of teeth and some of the speeds (r. p. m.'s) used in gearing? In most cases there is allowable a wide range in these; no designer is pinned down very closely to exact numbers by the conditions of the problem.

The pinion probably controls; the following represent good practice:

12 teeth, hand operated gearing, or nearly static load.
15 teeth, under 250 f. p. m. rim speed.
17 teeth, under 500 f. p. m. rim speed.
20 teeth, above 500 f. p. m. and high speed motors.

The 20-tooth gear is about 20 per cent stronger than the 12-tooth of the same pitch, runs more smoothly, wears less, and must in consequence be more efficient.

The other numbers of teeth in our tables were determined on the basis of a geometrical increase from 20 teeth on, and adding the 68 T and 96 T sizes to give a wider range of sizes for the higher speed reductions.

The table shows all reasonable speed reductions are possible with these gears; for a speed reduction it usually is unimportant whether there is a variation of 5 per cent either way from the assumed speed desired; these gears permit reductions within these limits.

It might be stated further that this system can be equally applied to cut gears, of the following diametral pitches, 4, 3, 2½, 1¾, 1½.

The powers in our tables are based upon the use of 5,000 pounds working stress at no load in the Lewis formula; this is a very conservative figure, with a good allowance for wear and shock.

Here, then, is a system of gears for the operating man who is not inclined to split hairs over theoretical points. *They can* be obtained promptly from stock at various points about the country as the demand is created. *They can* be manufactured in quantity which insures accuracy. *They will* meet every requirement within the limits of size and type.

Furthermore, the designer will find his labor decreased, he need only select a gear to fit the shaft, select a pinion to match the gear, make a countershaft fit pinion, select gear to fit the second shaft, select pinion to match the gear, and so on.

He can check his figures on a sound engineering basis and be satisfied that it is a good job, or he can take our word for it.

Shock-Defying Glass

According to newspaper reports, more people were injured by flying glass on the occasion of the recent Wall street bomb explosion than were injured by the slugs thrown by the bomb itself.

Although not yet generally adopted, science has provided a safeguard against injuries caused by broken glass. The comparatively new invention is called laminated glass. It is made in various thicknesses to withstand almost any impact to which glass might be subjected.

Glass especially made for tellers' cages in blanks is made of three thicknesses of glass. The middle section or core is of plate glass nearly 9/16 of an inch thick. The two outer parts are ⅛-inch thick. Between the core and the outer sheets are imposed pieces of transparent pyroxylin sheeting 20/100 inch thick.

A piece of glass of this composition, six inches square, was fired at from a distance of three feet with a rifle using a 32-calibre, nickle jacket, flat nose, high velocity rifle bullet. The bullet powdered the glass at the point of impact over an area measuring about an inch and a half in diameter. The bullet, however, penetrated only the top layer of the glass. The sheeting was exposed only in one small spot measuring about ⅜-inch in diameter, but was not even dented by the bullet. The heavy plate glass core was broken as was the under-sheet of glass, but was not penetrated and the only glass that fell from the underside of the block were some pieces so small that they could have caused no injury had they fallen on a person even from a great height.

However, glass of the thickness described above is not necessary to protect against falling glass such as occurred in the Wall street explosion. Glass of this type is intended only to stop bank robbers' bullets.

Glass for windows liable to be subjected to shock from explosions need only be the thickness of two ordinary sheets of window glass with one sheet of the pyroxylin sheeting superimposed between them. The lamination is effected by hydraulic pressure. Therefore, if an explosion causes the glass to crack, it is still prevented from falling by the pyroxylin core.

Taking Down Old Stone Walls

It was October. An old house was to be torn down and a new one in its location was to be under roof before cold weather. The question with the contractor was how to get the old building down the quickest.

Six men, assisted by 25 sticks of dynamite, 75 blasting caps and 200 feet of fuse had the stone walls in a pile in the cellar, and the foundation walls so loosened up that the stones could be lifted apart, in two hours. Two days later the debris had been carted away and the site was ready for the builders.

The dynamite had been loaded in bore holes about four feet deep, spaced four feet apart, against the foundation walls outside; in the four corners of the cellar under heavy mud-caps; and the four corners of the main floor, also under heavy-mud caps.

All charges were primed with electric blasting caps, and connected together in series and fired with a blasting machine.

Of course, 25 sticks would not have turned the trick if it had been a large building, with thick walls. The amount of dynamite to use on a job of this kind depends on thickness of walls and dimensions of building.

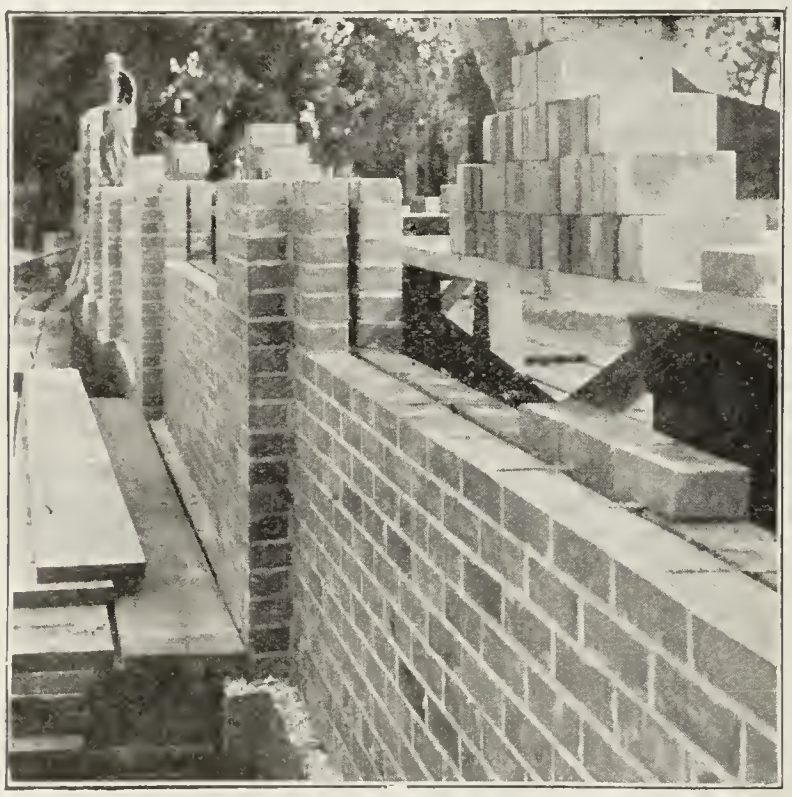
If the building is near other structures the loading would have to be different; that is, use light charges and loosen the masonry in small sections.

Concrete Brick Building for Brick Machine Factory

Manufacturers of concrete machinery would do well to build their factories and warehouses of concrete block, brick and tile, thereby proving their faith in concrete building units. Such faith is possessed by the Helm Brick Machine Co., 762 Mitchell St., Cadillac, Mich., as is evidenced in the construction of their new building in Cadillac. Their rapidly growing business demanded larger factory space and a building 60 to 90 feet was recently completed.

The cut shown below is a general view of the building used as a machine shop and assembling room with offices on the second floor. Walls are of concrete brick made on a Helm press Model 5 which was more than 15 years old. Brick were manufactured by a local concrete products plant, the proportions of materials used being 1 part cement to 5 parts bank sand. Vitri-Flux (a waterproofing compound which by its chemical action produces a stronger, tougher, denser, more homeogeneous concrete) was mixed with the mixing water in the proportions of 1 gallon of Vitri-Flux to 10 gallons of water. Tests made of the brick indicate that the use of Vitri-Flux increased the compression strength of the brick about 38 per cent.

Exterior walls of the building are constructed with a



Concrete Brick Wall with continuous air space.

narrow continuous air space. The two parts of the wall are bonded by crimped, galvanized wall ties. This method of construction provides insulation which permits plastering directly on the inner wall surface as was done in this building.

In addition to this building the company has a foundry, structural iron shop and blacksmith shop elsewhere in Cadillac. The new biulding in combination with the old should give the Helm Brick Machine Co. ample facilities to properly care for their growing trade. Concrete brick are gaining in favor and it will be well for all concrete brick manufacturers to obtain correct knowledge of their products. Crushing strength and absorption should be ascertained by tests made by laboratories of established reputation. Architects should be acquainted with the test results. Proper promotion of quality concrete building units demands more than the plain statement that the product is for sale. The manufacturer should be able to answer all reasonable questions put by architect, owner or building contractor. The fact that a manufacturer of brick machines believes concrete brick suitable for his own office and factory should tend to create

New Home for Helm Brick Machine Co., Cadillac, Mich.

confidence on the part of plant operators as well as buyers of brick, block and tile.

Products plants should be composed of buildings constructed of the products made for sale. No matter how modest the original buildings may be, the business should be conducted at a fair profit which will justify investment in permanent plant buildings. It is well to live up to the slogan, "Concrete for Permanence."

Unit System Septic Tanks

"After years of successful operation of a concrete products plant, we have experienced in the last six months, the dullest time in its history in the sale of blocks, brick, stave silos and burial vaults. During this time the sale of our Unit System Septic Tanks has increased beyond all expectations. We are shipping them out in single shipments, and car lots, and we are four weeks behind our orders. We sell to the plumbing trade and plumbing jobbers and in some localities we have agents selling directly to the farmer and the village house-holder," writes Wm. De Lhorbe, Oregon, Ill. "Every family who is not situated on a sewer is a prospective customer."

"The profitable shipping distance is a radius of about two hundred miles from our plant, and we have decided to offer for sale to other concrete products plants the

forms to manufacture UNIT SYSTEM SEPTIC TANKS.

"The limitations of this new business are boundless. A sewing machine agent considers two or three sales a week good business, but one of our salesman sold eighteen installations of our septic tanks three weeks ago last Saturday, in the little village of Erie, Illinois, with practically the same profit for each installation as is made on the sale of a sewng machine.

"You have little or no competition in your territory. Septic tanks are sold every month in the year. Our customers are community high schools, public schools, offices, stores, churches, hotels, dwelling houses, industrial plants, etc.

Recommended Practice for Concrete House Construction

At the convention of the American Concrete Institute last month the Committee on Concrete Houses, of which Emile G. Perrot is chairman, submitted as its report a tentative draft of recommended practice for concrete house construction. The report is confined to a consideration of the monolithic, unit constructed and plastered or gunite types. It probably will be revised before its final presentation and adoption by the Institute. The main features of the report follow.

This recommended practice shall apply to the construction of houses not over three stories in height and not exceeding 30 ft. in height between top of first floor and under side of third floor ceiling.

(a) Basement and foundation walls of monolithic concrete shall be not less than 6 in. in thickness and shall be supported on a concrete footing or basement floor sufficient to prevent settlement of the building. The design of these footings shall be based on the ability of the foundation soil to carry loads and the monolithic character of the concrete wall and footing or basement floor shall be considered in determining the required bearing area on the soil. Basement walls shall be designed to resit the horizontal pressure of the earth in contact with the exterior of the wall.

(b) Basement walls of precast units bonded together by registering or interlocking projections or depressions, grouted in place, or by reinforcing bars across joints embedded in cement mortar, shall have a minimum thickness of 7 in., or not less than the minimum thickness of exterior bearing wall of superstructure. The precast units shall conform in strength, quality and absorption to the requirements of Recommended Specifications and Building Regulations presented by the Committee on Concrete Products of the American Concrete Institute.

Note 1.—Allowing a total of 50 lb. per square foot roof load, 75 lb. per square foot for second and third floors, and 100 lb. per square foot for first floor, including weight of walls, the unit compressive stress per square inch on a 6-in. basement wall would be slightly in excess of 100 lb. The unit stress produced by the overturning effect of the wind on the side of the house would not materially increase this. The effect of the pressure on earth filling against the house is in a majority of cases small as compared with the vertical load of the superstructure and cannot materially affect the stability of a monolithic or properly bonded precast unit wall.

Walls.

(a) The thickness of single exterior bearing walls of plain concrete shall be not less than 4 in. thick, but when reinforcing in excess of 2 to 1 per cent is used, the thickness shall be determined by the usual methods of reinforced concrete design for vertical loads and for a uniform wind load of 30 lb. per square foot on exposed surface.

(b) The thickness of the bearing wall, of double or triple concrete walls shall conform to paragraph (a), this section, except that the thickness required to carry the loads may be reduced by the actual working shear value of ties between the walls.

(c) Exterior walls which act merely as curtain walls between reinforced concrete columns or studs shall be designed to withstand a wind pressure of 30 lb. per square foot on the exposed surface. Reinforced concrete curtain walls may be constructed by plastering and back plastering on expanded metal or wire mesh reinforcement, or shot with a cement gun or by other mechanical means of placing concrete or stucco.

(d) Exterior walls of precast units bonded together by registering or interlocking projections and depressions, grouted in place shall conform in thickness to the schedule of wall thickness provided for concrete block, brick, tile and architectural trimstone of the Recommended Building Regulations presented by the Committee on Concrete Products of the American Concrete Institute, except that large or small reinforced concrete units connected on two opposite ends to structural members designed to carry all loads to foundations originating from the weight of the building or from wind pressure or which in themselves act as structural members may have a thickness determined by the bending stresses produced by wind pressure of 30 lb. per square foot on the exposed surface.

(e) Solid concrete exterior walls shall be furnished with furring on the inside so as to produce an insulating air space between the interior finish and the concrete wall. Double exterior concrete walls, providing a dead air space between, may be finished without further provision for insulation.

Floors.

Reinforced concrete floors shall be designed to carry a live load of 40 lb. per square foot uniformly distributed. The arvantage of continuity in reinforced concrete floors shall not be assumed unless the concrete is placed continuously over intermediate supports for the entire length of the floor, with appropriate reinforcing to take care of negative moments.

Roofs.

(a) Flat concrete roofs shall be designed to carry the dead weight of the roof and 20 lb. per square foot additional for houses constructed in climates subject to heavy snowfall sloping roofs shall be designed for 30 lb. per square foot on the vertical projections of the roof surface exposed to the wind.

(b) Concrete roofs without other covering shall be constructed of non-porous aggregates so graded as to produce a dense, impervious concrete. For additional assurance of watertight construction, waterproofing compounds may be used. Reinforcement of the amount of .2 of 1 per cent shall be placed in the top portion of the roof slab to resist temperature stresses.

Materials.

(a) Only standard portland cement, which meets the requirements of the Standard Specifications for Cement of the American Society for Testing Materials, in effect as of January 1, 1921, shall be used in the construction of houses.

(b) All aggregates shall be clean material, free from dust, ashes, lumps of coal, vegetable loam and organic matter.

(c) Cinders may be used as coarse aggregate for partitions and for exterior walls, providing tests show the resulting concrete will average a compressive strength of 10 times the loads to which it will be subjected. Cinders shall be composed of hard, clean, vitreous clinker, free from sulphides, unburned coal or ashes.

(d) Slag used for coarse aggregate shall be clean, dense, air-cooled blast furace slag containing not more than 1.3 per cent of sulphur and shall weigh not less than 70 lb. per cubic foot when loosely packed.

(e) Rods and bars used for reinforcing shall conform to the requirements of the Specifications of the American Society for Testing Materials for Concrete Reinforcing Bars in effect January 1, 1921. Cold drawn steel wires, made from billets, may be used in

floor and roof slabs, column hooping and for temperature and shrinkage stresses. Wire mesh or expanded metal may be used for its full cross-sectional value to resist stresses, providing its component parts meet the requirements for tests for concrete enforcement bars of the American Society for Testing Materials.

(f) The water used in mixing concrete shall be free from oil, acid, alkalies or organic matter.

Design.

The design of floors, roofs, beams, girders and columns shall be governed by Section 4, "Design," of the American Concrete Institute Standard Specification No. 23.

(a) Reinforcement shall be properly located and secured against displacement during the placing of the concrete.

(b) Machine mixing is to be preferred, but where it is necessary to mix by hand, all ingredients shall be turned together until the mass is homogeneous in appearance and color. Hand-mixing shall be done without losing an appreciable amount of mortar. A small batch mixer is most satisfactory.

(c) Only enough water shall be used to produce a consistency such that the concrete will flow sluggishly into the forms and around the reinforcement without separation of aggregates from mortar. Concrete shall be protected against rapid drying out and shall be protected against freezing until it has hardened for at least 10 days in a temperature not less than 35° F. Concrete shall be deposited in the forms not more than 30 minutes after mixing.

(d) Forms shall be substantial and sufficiently tight to prevent leakage of more than 1 per cent of the mortar. They shall not be removed until the concrete has hardened sufficiently to sustain without injury to the concrete the loads that will come upon it. Window and door frames may be set in the forms and the concrete cast around them. Wooden frames should be well primed and should be anchored to the concrete by means of long spikes or bolts. They should be braced against distortion from the pressure of fresh concrete.

Agricultural Limestone Machinery

By L. H. Sturtevant*

The benefit to the soil by the use of agricultural limestone is now universally recognized and thousands of tons are distributed regularly to the farmers in many sections of the country. The kind of soil needing lime, the amount to be applied per acre, the fineness of the lime, and the kind of machinery producing it, have also become standardized, so that now nothing remains to hinder this rapidly growing industry. It is now strictly up to the machinery manufacturers to perfect their mechanisms so that ground limestone may be produced at minimum expense.

Simplicity, durability, quick accessibility, reasonable cost and minimum power are the principle points to be considered. As this business is divided into three classes of producers, each requirement must be carefully considered so that the right machine will be purchased in each individual case. These classes are divided as follows: First, the large producer of agricultural lime, grinding hundreds of tons per day; second, a company or a farmers' co-operative association which operates on a moderate scale; third, the farmer himself, or the small grinder who wishes to produce limited quantities of lime, or to run his machine intermittently as lime is required.

*Mgr. Sturtevant Mill Co., Boston.

The first class can afford to invest the necessary capital for a complete plant designed for quantity production, install dryers, and the best of labor-saving equipment to produce at least cost. The second class in some cases can do likewise, but many times would prefer to limit the investment even if the ground stone costs more. The third class in practically all cases must install a plant at the lowest possible price consistent with good machinery, and manufacture as cheaply as it is possible under the circumstances.

There are two types of pulverizers well suited to this business—the ring-roll mill, a big, slow speed, durable grinder, which one can install and forget as far as wear, tear or trouble is concerned; and then there is the high speed swing sledge or hammer type of pulverizer, more widely used on account of its lower first cost and simplicity of plant.

Of the two types of machines the one recommended entirely depends on conditions, each being first-class in every respect. The low speed mill is the more durable, and also is more expensive and requires a screen; while the high speed machine takes more power per ton of rock ground, and the upkeep expense is greater; it, however, needs no screen.

For the small producer the swing sledge mill is without question the better of the two; for the large manufacturer the ring-roll is far superior; but the man of medium requirements should look carefully into both types before reaching a decision.

They differ greatly in principle, the ring-roll crushes the limestone on itself between ring and rolls, where it is held by centrifugal force. Ring and rolls do not touch each other, the crushing and grinding action is entirely by pressure exerted at slow speed against the limestone itself, which accounts for its extreme durability. The swing sledge mill pulverizes by a series of tremendous blows delivered at lightning speed to the stone fed into it. Nothing can withstand such impacts and the fine stone passes through grates at the bottom of the mill case. One can see at a glance that such a machine must necessarily wear considerably, but being armored this wear is not excessive per ton of stone ground.

A proper decision therefore depends on many circumstances, capital, competition, output, operating expense, etc.

"LeClair" Scraper Added to Sauerman Bros.' Line

Announcement is made by Sauerman Bros., 1140 Monadnock Block, Chicago, that they have arranged with S. D. LeClair of San Francisco, Calif., to take over the manufacturing and selling rights on the power drag scraper of which Mr. LeClair is patentee.

The "LeClair" scraper that is commonly used in excavating sand and gravel and re-handling loose materials is V-shaped, a feature that distinguishes it from the three scrapers of Sauerman design, the "Crescent," "Excavator," and "Type C."

The new up-to-date gravel and sand plant recently completed at Millbrook, Mich., by the Midland Gravel Co., Albert Reed, gen. mgr., Remus, Mich., is equipped with a "LeClair" scraper, a Symour 36 inch disc crusher and a No. 4 Gates crusher.

News of the Cement Mills

Superintendent A. D. Stancliffe of the design department and Purchasing Agent D. A. Keller of the Western States Portland Cement Co., have been transferred with their staffs from the headquarters at Independence, Kans., to a permanent location at Nuttings station, Davenport, Iowa.

The business of the new concern will be handled directly from the plant at Nuttings instead of from Independence as formerly. The construction work at the plant is well under way and 100 men are being employed at the present time. It is expected that 100 more will be added to the force the first of June.

The company started this week to quarry rock at the plant for use in construction and it is expected that the stone crushers will be operated next week.

About twenty officers and directors of the company, including A. W. Shulthis, president, and J. P. Rucker, secretary-treasurer, were recently in Davenport for their first inspection trip of the plant. They were guests at a dinner given by the chamber of commerce during their visit.

Despite the fact that industry and business in general has suffered a serious depression in the past year the cement industry passed through the period with practically no decrease in sales, according to M. J. Nicholson, president of the Gilmore City Cement Company. Facts substantiating this statement were revealed to the directors of the corporation who met recently in their regular meeting.

The meeting was not confined purely to routine business. Instead a tour of inspection was made from the general offices in Fort Dodge to the plant in Gilmore City.

Discussing the cement situation Mr. Nicholson said, "The cause for the continued demand for cement is still a mystery to me, of course we are more than pleased to have the demand keep up, but we are going to try and find out the exact cause for it keeping up."

"Sales this year have been ahead of sales for the past few years with us. Of course this is accounted for by the fact that we have materially increased the capacity of our plant in the past year and are able to carry a bigger volume this year.

"During the period of depression we have continued with our entire force of employes, 125 men, except in the winter months, but we always have a drop in business during the winter. We had expected last fall to lay off some men this spring, but business fooled us and we have been running at full capacity all spring.

"Prices have dropped some in the past year and salaries for our employes have also been cut. Last winter our employes voluntarily accepted a cut of 20 per cent in wages," he added.

"At the present time Mr. Nicholson said the Gilmore company was shipping more than the capacity of the plant. Average shipments in May have been 2,500 barrels daily. The daily capacity of the plant is 1,500 barrels.

The fifteen mills of the Lehigh Portland Cement Company are to hold a Safety First contest during the month of August. These mills are scattered over the country from coast to coast.

The mill which makes the best record for the month will be awarded a pennant.

The mill at Oglesby, Ill., made the best record for last August. It was the only mill to go through the month without an accident. Five other mills went through without loss of time.

Bulletins will be posted every week during the month of the standing of the various mills.

The whistle will be blown every morning at ten o'clock if no accidents have occurred during the previous twenty-four hours.

Interest is running high in the contest within the Lehigh plants.

The Pyramid Portland Cement Company is building a plant at Valley Junction, a suburb of Des Moines, Ia. It has outstanding $893,020 of preferred stock fully paid for and $353,140 of stock has been partly paid for. Also $15,560 of common, fully paid, and $4,100 partly paid. The plant was appraised recently and is said to be valued at $850,000, this is exclusive of $201,405 of net current assets. Actual operations have not yet started.

United States Portland Cement Co., Concrete, Colo., has completed the installation of a third kiln, with the necessary supplementary machinery. The kiln is 9 by 125 ft. and was made by the Vulcan Iron Works. F. L. Smidth kominuters and tube mills are used on the raw grind. Another Jeffrey pulverizer has been added for preliminary grinding on the raw side. A Ruggles Coles dryer has been installed and a new coal dryer. The steel building covering the plant has been extended to accommodate a fourth kiln, for which machinery is now being purchased. It is the intention of the companies operating in Colorado to try to supply the requirements of consumers that are within shipping distance. The output of the concrete plant, with its third kiln, will be 60,000 bbls. per month, and the fourth kiln will add another 25,000 bbls.

"I want to call your attention to a matter which I regard as of the utmost importance, that is, the manufacture of cement where the conditions for so doing are particularly favorable and where there are large and increasing quantities consumed, especially in the construction of good roads," writes G. W. Soule, Meridian, Miss.

"Cement is one of the increasingly important articles of construction, and, being heavy, the transportation costs are usually a very important part of the expense of its use, and, of course, it should be made at whatever point it can be made economically nearest its point of consumption.

"I do not think it is made in Mississippi, but the raw material for its manufacture exists in superior abundance. While limestone of the preferred quality for making quicklime is not plentiful, the quality of limestone preferred for cement lies close to the surface of the ground in a large part of the State, notably in the counties of Noxubee, Lowndes and Monroe, just across the line from the coal fields of Alabama, where the needed fuel may be had in abundance and cheaply.

"Mississippi has before it the building of roads costing millions of dollars, and a large part of these millions must be paid for cement. If the cement was

manufactured at home, a large part of this would be saved.

"However, the place where cement may be made more cheaply and profitably than anywhere else in the world is on the Tombigbee River, in the western part of Alabama.

"There is on the Tombigbee River, a few miles below its confluence with the Warrior, a Government dam and locks. The power of that dam is going entirely to waste, and it is not available for distribution over the country because there is perhaps one month of each year when there is no power available on account of high water. But perhaps 11 months of the 12 there are many thousands of horse-power. Not many miles above this dam there exists on the bluffs of the Tombigbee an inexhaustible quantity of lime rock of the quality preferred for cement-making, and at such height that it can be loaded on barges by gravity direct from the quarries. It has little or no overburden. There is on the banks of the river an abundance of clay, and lime and clay, with little or nothing else, make Portland cement.

"Power sufficient can be gotten from the dam for all purposes of the work. In the manufacture of cement manual labor is an almost insignificant part, and it would be no hardship for the labor so employed to take the time when there was no power for holidays.

"I do not know that heat derived from electricity has been employed in the manufacture of cement, but it is used for the melting of steel and iron, and, of course, could readily be employed for the burning and drying of cement in the process of manufacture.

"The cement made at the dam could be readily transported for distribution to Mobile down the river by barges, also up the river for use at Birmingham and other places.

"The power there once installed would cost nothing but the wear and tear of machinery; the material on barges would cost less for transportation that it would cost by land for even a few hundred feet. Taken altogether, the cost of making cement there would probably be less than half it costs at most anywhere else.

Cement has become a very important part of nearly all kinds of construction; its use is very rapidly increasing; it is very important that it can be obtained at the lowest cost possible, and there is no reasonable possibility of there being an oversupply."

Railroad Type Shovel Swung End for End in Shale Quarry

The method used in turning end for end a heavy shovel of the railroad type operating in a shale quarry is told in a recent issue of The Excavating Engineer, by E. J. Strock, superintendent of the Colorado-Portland Cement Co., Portland, Col.

In working the shale quarry each cut was carried lower than the preceding one, giving the floor a staircase appearance and making it impossible to have any great width of level floor on which to turn the shovel. The shovel was backed to within its length of the place where the new cut was to begin, chains were disconnected, and the rear end of the shovel jacked up.

The rails had been bent to a curve, the radius of which was the distance between truck centers. These rails were bridled together and set loose on ties laid at right angles to the length of the shovel, but curved in the arc of a circle. The rear truck was then swung at right angles to its usual position and lowered to the rails. The dipper hung free in front.

The rear end was then moved around the curved rails until the front truck jammed. Next the front end of the shovel was jacked up, the jack screws following closely in case a jack failed. When clear of the rails the front truck was swung around in the same direction as the rear was moving until the truck jammed, the short section of track fitted under the truck in its new position, the truck lowered and the rear end again pinched over. This was repeated until the shovel was facing in a direction directly opposite to its original one.

Bank Run Gravel*

Mr. M. D. Smith of A. J. Smith Construction Co., Detroit, Mich.—I was wondering if it were possible to have some standardization of materials. That might be referred to the proper committee and it could be taken up with the Highway Departments. It applies to every state. You go into one part of the state and you get washed gravel. You might go fifty miles back into the country and you get bank run gravel and they allow you to use that. Then there are times when you can ship the bank run gravel into the river district and use the cheaper material; but they won't permit you to use it. Now, if it is good enough in one place it ought to be good every place. There ought to be some standardization of materials, for those conditions exist in every locality. We might refer that to the Committee on Materials and they might be able to work out something.

Captain Fauntleroy (representing the Federal Bureau of Public Roads).—Mr. Chairman, I would like to make a little explanation on that material business. We have never found any bank run gravel that ran uniform, and when you go to use bank gravel you do not know what you get, that is, for a concrete mix. It has been the policy of the Public Roads Bureau not to permit bank run gravel in concrete. We have had serious trouble by local inspectors using bank run gravel, and it would vary from one part of sand to two or three parts of gravel up to four or five parts sand and one part of gravel.

Mr. Peterson (Henry W. Horst & Co., Rock Island, Ill.).—I would say in Iowa we have had cases of where bank run gravel has been permitted to be used in pavement without washing. There it would be of interest to us to know whether there is a discrimination against bank run gravel or not.

Chairman S. D. Moore (Moore & Young Construction Co., Waterloo, Iowa.)—We are fortunate in Iowa to have our bank run gravel much more uniform and superior to river gravel. There are certain gravel deposits in the state that are better material, run more uniform and are more available than some of our river quarries. We are having that experience on one of our jobs in Benton County, where we attempted to get the stuff out of the river and abandoned it and got it off the bank.

The subject was, by vote of the Division, referred to the Committee on Materials.

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*Remarks before the Highway Division of the Associated General Contractors Conference, New Orleans, La., January 25, 1921.

THE LARGEST DYNAMITE PLANT IN THE WORLD

at Your Service—

THE origin and perhaps the keystone of Du Pont Explosives Service, a model plant made possible only by over a century of experience, is the Repauno Works, the largest and most complete dynamite plant in the world.

Covering 933 acres, with 1400 acres additional held in reserve for isolation and possible future expansion, this gigantic works has a capacity of 60,000,000 pounds of dynamite a year.

—it has produced 5,184,000 pounds in one month
—and 49,402,000 pounds in one calendar year
—its power plant is rated at 4350 H. P.
—it employs 1357 people

The Repauno Works is backed up by five other complete Du Pont dynamite plants and by eleven Du Pont black powder mills. The vast *production* of these plants is maintained of uniform high quality by the work of over 300 chemical and ballistic engineers. The *distribution* of Du Pont explosives is handled through more than 300 magazines—so located throughout the country as to serve the greatest number of users of explosives in the shortest possible time. A staff of expert field men co-operate in insuring their most efficient *use*.

It is very largely this complete, efficient service that is causing more and more users of explosives to standardize on Du Pont.

We shall be glad to confer with you regarding your particular explosives problems.

Put your explosives problems up to Du Pont

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EXPLOSIVES ~ SERVICE

News of the Concrete Products Factories

G. E. Krause, Juneau, Alaska, manufactures concrete brick, blocks and roofing tile.

R. E. Hamilton & Sons, 600 Waterman Avenue, Detroit, Mich., are busy turning out a high quality concrete building tile, blocks and brick which have found favor with architects, engineers, builders and contractors. They operate the best and most modern equipment including Besser tile and block machines, and a Kent continuous mixer.

The Dunn Automatic machine makes without pallets in large quantities at lowest cost, drain tile, hollow building tile and silo tile, enabling you to supply the market for all three products with one machine, assuring continuous operation and large profits on small investment, writes the W. E. Dunn Mfg. Co., 414, 24th St., Holland, Mich., who establish and develop concrete tile plants of any size that will adequately supply the demand for their products. Your inquiry as to their methods and their plan of accepting a liberal part of their pay from your profits is solicited by the Dunn company.

To dodge trouble in securing aggregates and water and to see that his silo gang is well fed C. K. Poindexter, Marcellus, Ky., goes from job to job with an equipment that is unusually complete. To overcome the objection of his customers to boarding the silo gang and to make sure good "chow" is ready on time, Mr. Poindexter has built a portable kitchen.

On a low 2-ton steel truck is built a 16′ body, 6′ wide or even with the tips of the hubs. The bed of the truck gives a 40″ working space and beyond it over the wheels are built tables along either side. The body is substantially framed and bolted. It is covered with 5/8″ sheathing horizontally and has a corrugated iron roof with a 5″ crown.

Above the tables are shutters arranged to open out from the top. The men sit or stand outside sheltered by the extended shutters. The kitchen is fitted with a coal stove and substantial cooking utensils and dishes, including large air tight metal cans for supplies.

The Baldwin Roof Tile Co., Box 1483, Mobile, Ala., are building a plant to manufacture concrete roofing tile, daily capacity 1,800.

The Dethloff Cement Products Co., A. G. Frendeman, Manager, 169 Park Place, Akron, Ohio, have placed an order for Ideal block machine tamper, mixer and motor. Wants prices and catalogs on screening arrangement and conveyor system, fence posts, tile molds and new developments in block or brick machines.

Southern Concrete Products Co., W. Carl Austin, Secretary, Anderson, S. C., advises us they are going to also manufacture sewer pipe and want prices and catalogs on the latest and most modern machines.

Frank R. Hahn, concrete block manufacturer, 1362 North Broadway, Decatur, Illinois, writes: "I am putting out a new method of floor and also roof construction. It is a pre cast (factory product), can be laid in freezing weather, is lower in cost than cast in place. Ceiling plates have impressed figures like stamped metal ceiling, something that can not be had with plastering. Wires and pipes can be placed between floor and ceiling, and construction work will not be delayed. For roof construction, especially the bond needed on any roof is taken care of. Like everything else the article being far from perfect, is in my opinion a good step toward a less costly method of roof construction than we have so far. I have an application on file for patent."

A favorite crusher with concrete product manufactures is "The Universal" made by the Universal Crusher Co., 230 Bee Ave., Cedar Rapids, Iowa. It seems to be the logical machine to supply the necessary aggregate for the concrete block and tile man. Because of correct design, good materials and superior construction, with extra strength, simplicity and the correct principles upon which it is based, the Universal affords greatest capacity with lowest horse power requirement and minimum maintenance expense. It is built in various sizes to meet every need.

Every piece of Micaspar, which is universally used for facing concrete blocks and in stucco work, is washed, thoroughly dried and shielded against dust. Micaspar lives up to the specifications of a good aggregate—hard, irregularly shaped, practically waterproof and clean. The sparkling black biotite, unlike the mica in granite, does not lose its life in the crushing process. To reconstruct into good-appearing stone, the mica must be separate from the spar, so that the two may later join. This is the secret of getting a sparkling stone. Where the mica and its associates remain together in the crushed particles, the mica has been too soft and the stone becomes dull and bluish. Biotite mica retains its sparkle permanently. The particles of spar are of neutral tints, and their crystal nature blends well with all colors and sets off the mica. This happy association of mica and spar gives to concrete a pleasing and distinguished appearance as well as an atmosphere of solidarity and durability. The objection to the natural cement color can be done away with and a stone equal in durability and appearance to block granite constructed through the use of milled Micaspar. This material is furnished in several gradings or sizes to suit every purpose. Further information may be obtained from the Crown Point Spar Co., 101 Park Ave., who will send an instructive booklet entitled "Micaspar; How to Use It" to anyone interested.

Wm. E. De Lhorbe, concrete silo builder, Oregon, Ill., manufactures burial vault molds (his own patent), Standard silo molds, and Oshkosh mixer. Has placed on the market molds for making concrete septic tanks, write for particulars.

Appleton, Wis., newest industry is a company for the manufacture of "cast stone" building blocks which has started operations in a building on Meade street. Edward L. Vandenberg is head of the company which also has a plant at Kaukauna. About 600 blocks will be made daily as soon as the plant gets well started.

The plant of the Canby Cement Tile & Block Co., Canby, Minn., formely owned by E. M. Hampton, has been sold to a new company who will resume active operation of the plant at once.

A BIG DEMAND FOR THESE VAULTS
—PROFITS LARGE—

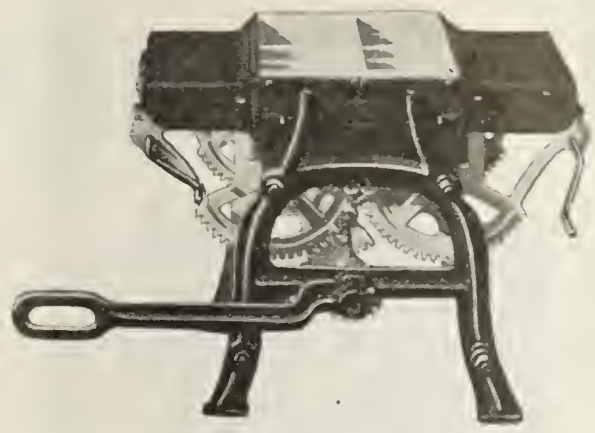
With our Adjustable Steel Molds you can easily make any size of the Automatic Sealing Burial Vault at an exceedingly low total cost.

When once they are seen and used in a community the Automatic Sealing Burial Vaults come into instant demand. They are far superior in every way to any other cement or steel vaults.

The manufacturing of these Automatic Sealing Burial Vaults with our Adjustable Steel Molds is a big money making opportunity. The first ten vaults you sell will more than pay back your entire investment—materials, molds, time, etc., etc.

Write us for complete particulars.

Automatic Sealing Vault Co.
216 E. River St. PERU, IND.



Double your daily output with

DOUBLE-SPEED
Brick and Block Machines

Now is the time to increase the capacity of your block plant—turn out the maximum number of wall feet per day, while the demand for building materials is at its highest.

Block Output

Our Double-Speed Block Machine makes in each operation: 2 hollow blocks, 2 silo blocks, 2 solid blocks, 2 slabs, 4 half blocks, 2 water table slabs, 2 return ends, 2 chimney blocks, or 2 porch pier blocks.

Brick Output

Double-Speed Brick Machine makes 16 brick at each operation, 8 brick being delivered at each side of the machine.

Double Speed Tamper

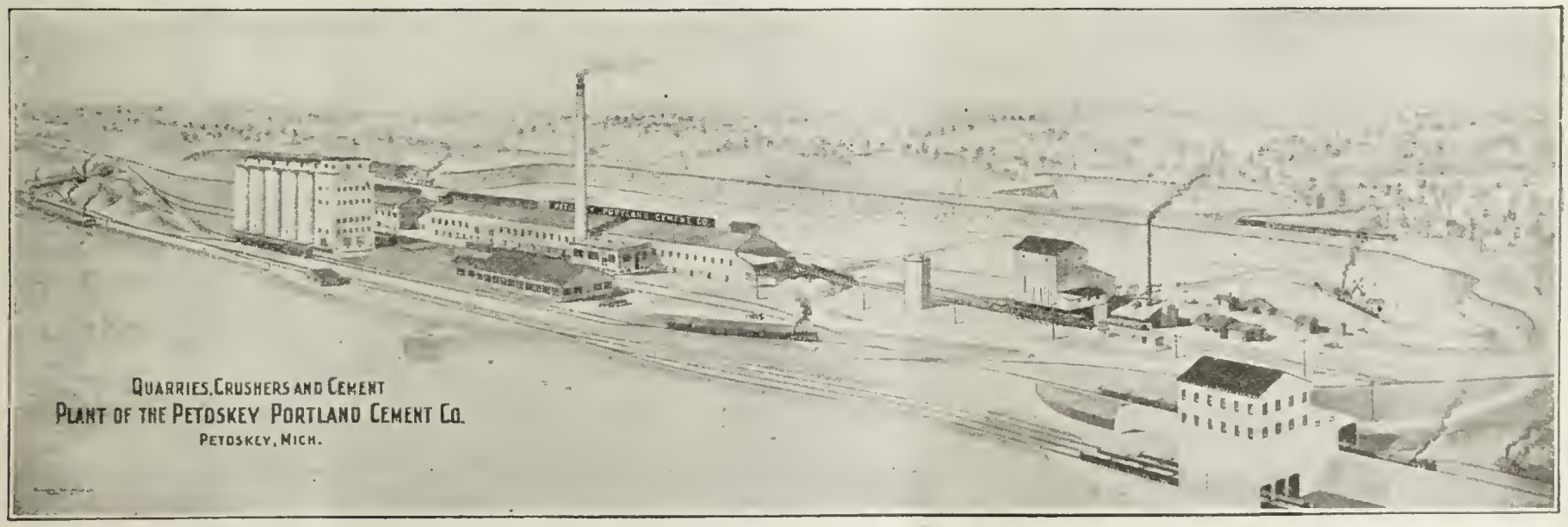
This power tamper gives our block machine a capacity of 1,500 blocks per day and speeds the brick machine up to 15,000 brick per day. Roller-cut-off removes surplus material from mold box and finishes the top of the product. The block and brick are tamped rapidly and vigorously, resulting in a dense, strong product. Machine consumes little power and is practically fool-proof.

Write for block and brick machinery catalog, Dept. A,

Wood Bros. Thresher Co. Des Moines, Ia.

THE KILNS IN THE NEW PLANT OF THE
PETOSKEY PORTLAND CEMENT CO.

are lined with high grade fire brick furnished by The Davis Fire Brick Company.

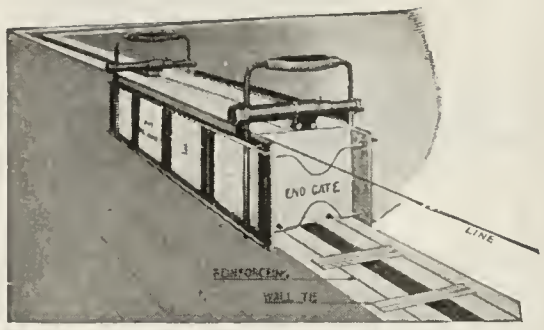


We devote a special department to the manufacture of brick particularly adapted both physically and chemically to cement kiln construction. Large stock carried. Prompt shipments made.

Write for quotations on standard and special shapes.

THE DAVIS FIRE BRICK CO.
OAK HILL, OHIO

Build the Hollow Wall Way



Like a thermos bottle—warmest in winter—coolest in summer. Fire-proof—everlasting.

Cheapest, best and most perfect way known to the building world.

The reason the most wall can be built for the least money with our forms is—because they are STRONGEST—LIGHTEST—SIMPLEST and MOST PERFECT, and the price of a complete set can be saved on one small job. Send for literature.

The Universal Cement Mold Co.
North Milwaukee **Wisconsin**

SWABY

Gravel and Dredging Pumps

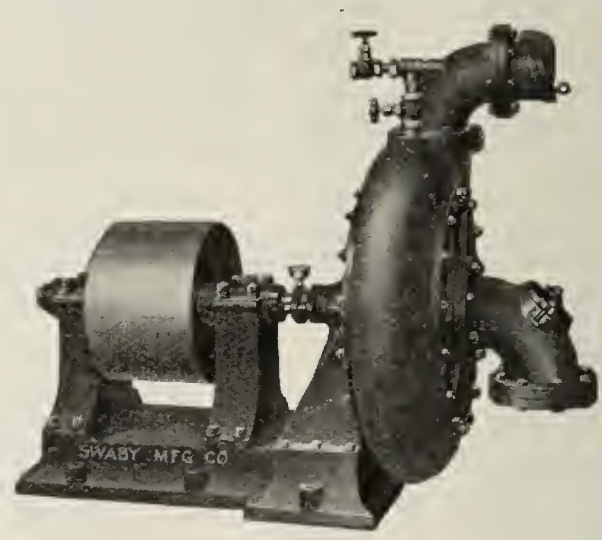
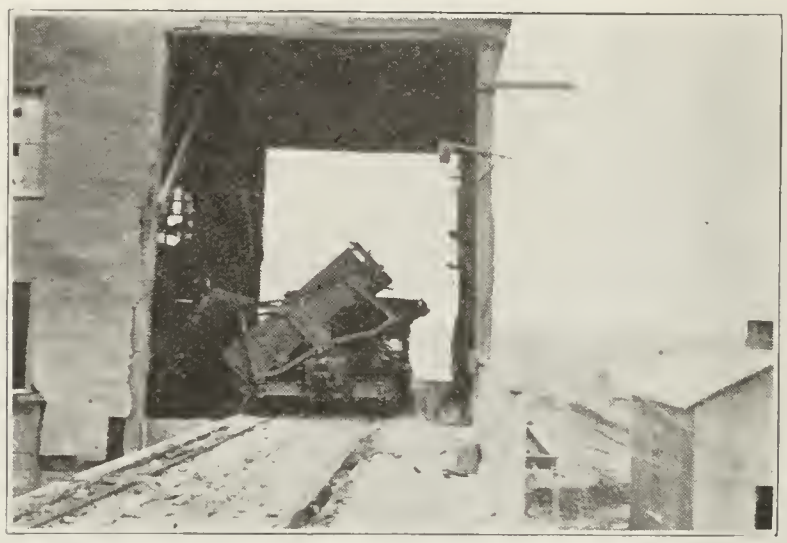


Illustration shows belted outfit but can also be supplied direct connected to Vertical Engine upon same base.

Swaby Manufacturing Co.
2010 MARSHALL BLVD.
CHICAGO, ILL.

Dump Cars in Cement Manufacture



Northwestern States Portland Cement Company's Western 6-yd. dump cars at crusher.

Portland Cement Plants are installing Western 6-yd. dump cars, where standard gauge equipment is desired, and Western 4-yd. or 5-yd. cars, where narrow gauge.

Local conditions determine the size of car, but almost invariably it is a **Western**—for stripping, for handling shale and often for handling stone.

The Lehigh Portland Cement Company, in stripping off shale, dumps a train of six 4-yard Western cars in from 17 to 25 seconds, without stopping the train, and keeps it up all day.

Whatever your haulage problem, there is a Western car that will solve it. Let us help if we can.

Write Today

Western

That's Why

Western Wheeled Scraper Company
Earth and Stone Handling Equipment
Aurora, **Illinois**

SAND PUMPS

That pay the largest dividends per dollar of investment.

"The Pump That Makes The Money."

This Pump is all that is implied in the name

LIGHTNING

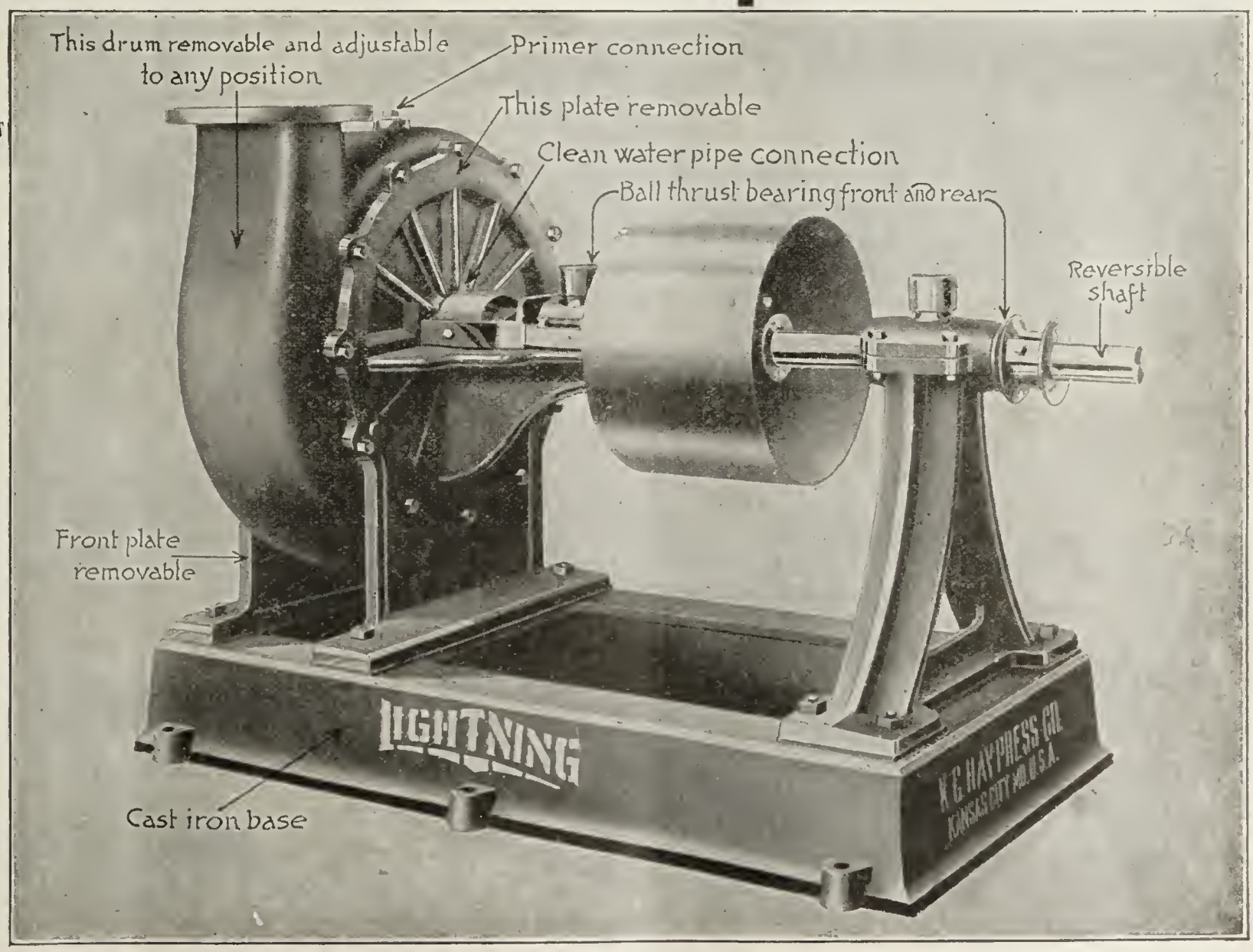
Its rugged construction and Simple operation assures maximum efficiency in operation at all times.

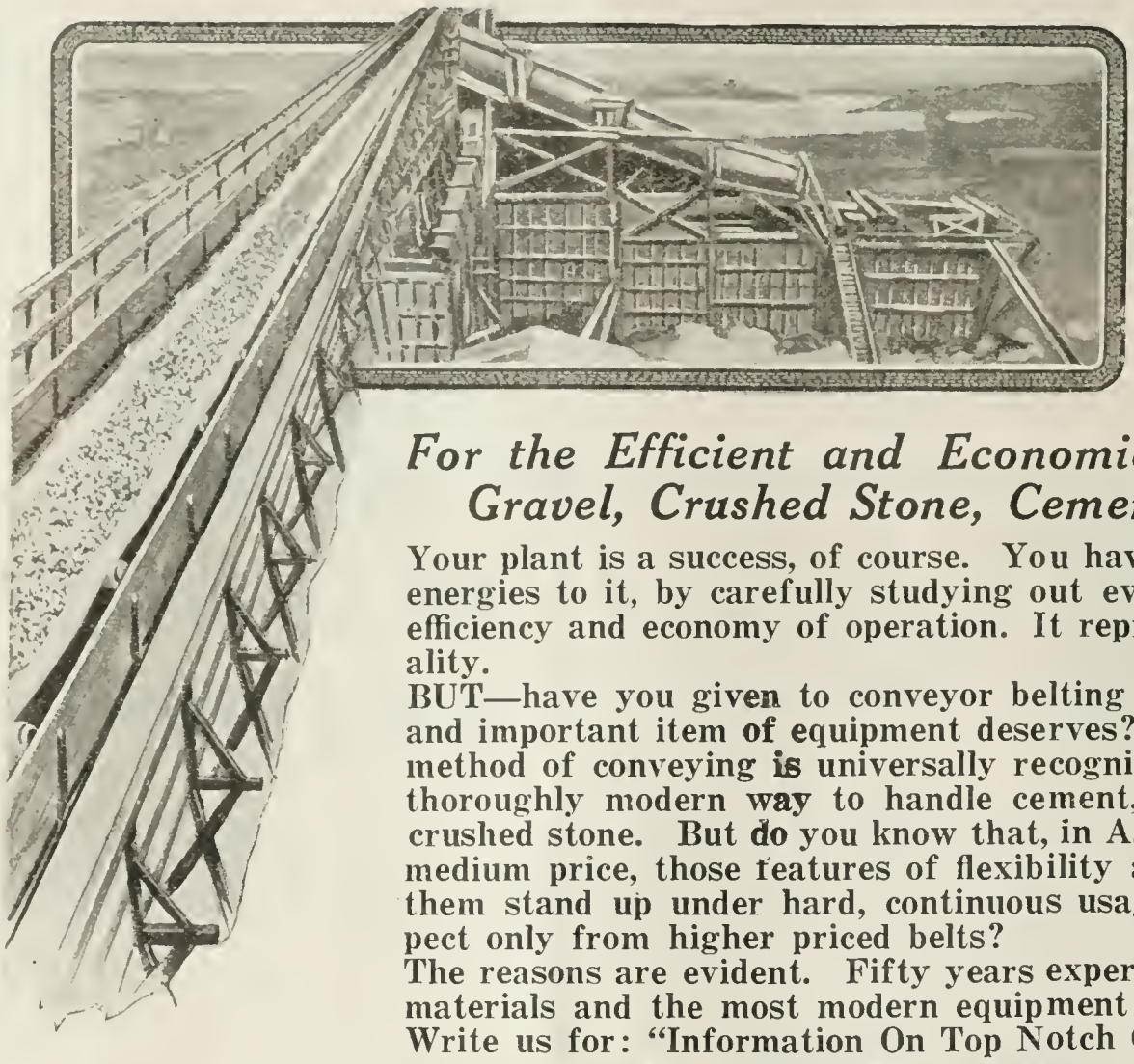
It is easy to adjust and easy to replace parts. Thousands in successful operation are striking endorsement of their dependability.

KANSAS CITY HAY PRESS & TRACTOR COMPANY

KANSAS CITY, MISSOURI

THE PUMP OF SIMPLICITY AND STRENGTH





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For the Efficient and Economical Conveying of Sand, Gravel, Crushed Stone, Cement, Clinker, and Coal

Your plant is a success, of course. You have made it such by devoting your energies to it, by carefully studying out every possible way to increase its efficiency and economy of operation. It represents and reflects your personality.

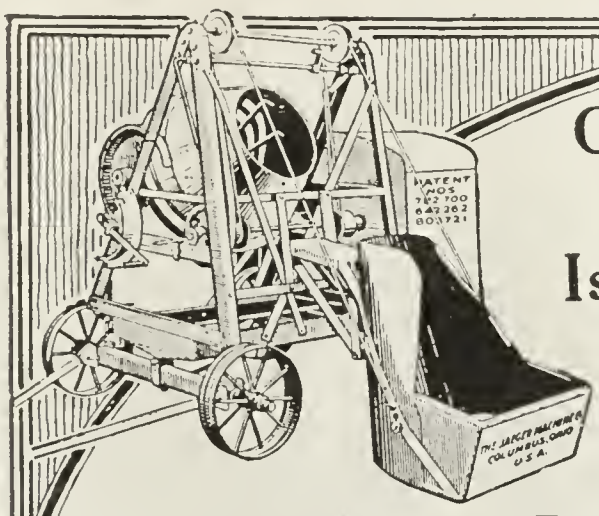
BUT—have you given to conveyor belting the attention this most necessary and important item of equipment deserves? Of course, you know that this method of conveying is universally recognized as the only up-to-the-minute, thoroughly modern way to handle cement, clinker, coal, sand, gravel and crushed stone. But do you know that, in AJAX BELTING, you can get, at a medium price, those features of flexibility and wear resistance which make them stand up under hard, continuous usage in a way which you would expect only from higher priced belts?

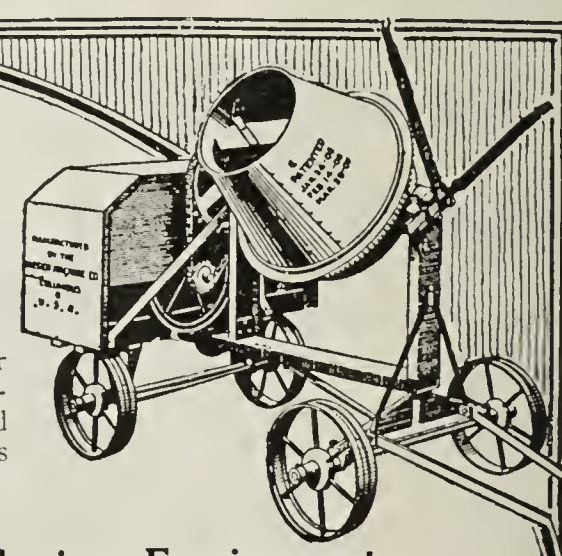
The reasons are evident. Fifty years experience in good belt making, proper materials and the most modern equipment are bound to give RESULTS.

Write us for: "Information On Top Notch Conveyors." It's free.

THE GUTTA PERCHA & RUBBER MFG. CO., 301 W. Randolph St. **CHICAGO**

NEW YORK BOSTON PHILADELPHIA SAN FRANCISCO





One Thing Is Certain THE JAEGER Is a Bear for Speed

Outfitted with Jaeger mixers and Jaeger Placing Equipment you have the time-saving, labor-saving aids that cut cost and land the better jobs and the bigger profits for you.

A Mixer for Every Job

With three sizes of batch capacities—with fourteen different outfits. No matter what kind of concrete work you have, there is a Jaeger Mixer for you. Each Jaeger Mixer is famous for being efficient, economical, strong, durable, and low in first cost.

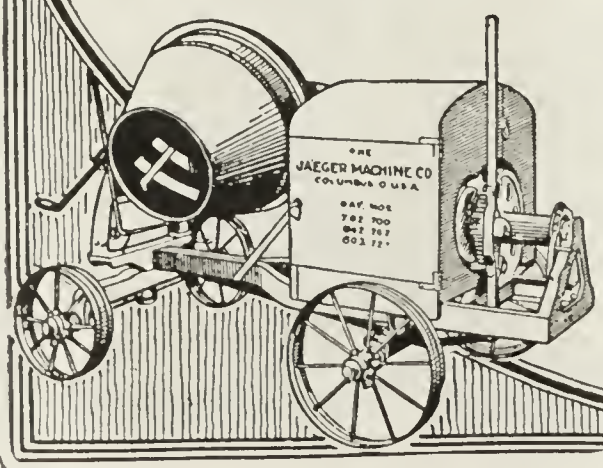
We guarantee the Jaeger Mixers to be constructed of the best material in the best mechanical manner.

Jaeger Placing Equipment

consists of the Jaeger Mixer complete with loader and hoist. Spouting outfit consists of 50 feet of track and 10 foot sections, and adjustable legs. Skip car holds one full batch of concrete and is automatic in dumping and equipped with brakes. The hoist pulls this car up to hopper where it dumps.

Full information and prices mailed on request.

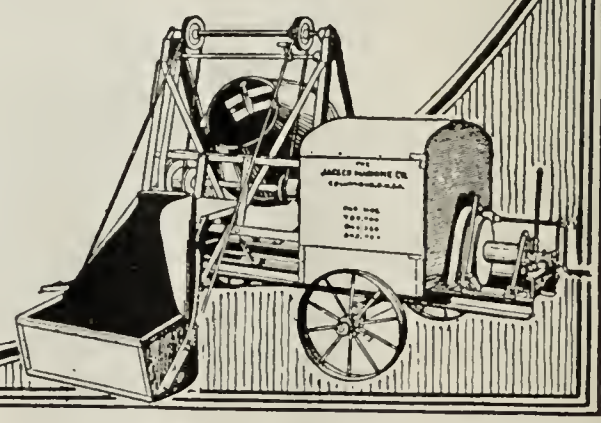
THE JAEGER MACHINE COMPANY 212 Dublin St., Columbus, Ohio



Quality

MIX A MINUTE

Mixers



the 3 essentials

Correct Mixing

Minimum Labor

Quality Products

THE CHOICE OF THE WELL INFORMED

THE KENT CONTINUOUS MIXER

We claim—and conservatively—that the Kent Mixer has embodied in its design and construction more real points of superiority than any other mixer made for concrete products factories.

Some of the outstanding features are: Correct and proper proportioning of aggregates; continuous in operation; time and labor saver; especially designed for concrete products plants; does its own measuring, proportioning, mixing, watering and discharging accurately; operates entirely by itself; does away with the cumbersome hoisting cars, charging platforms, chains, cables and what not on many of the old-fashioned batch mixers, etc., etc.

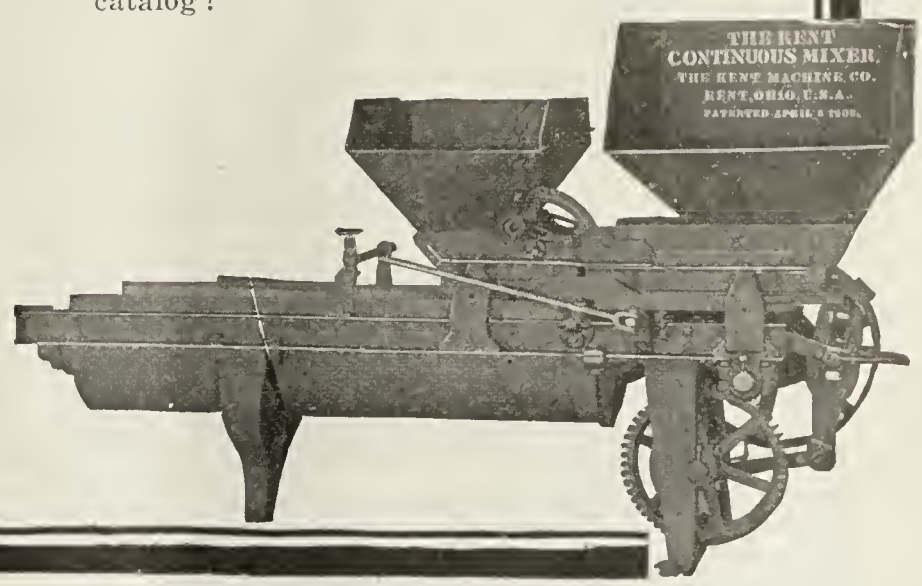
To fully explain these and many other points of superiority—may we send you a catalog?

The three elements to successful concrete block and tile factory operations are inherent characteristics of Kent Continuous Mixers.

Write for Catalog

The Kent Machine Co.

Kent, Ohio



Hollow Walls and Solid Walls

These Forms build either kind. The Forms will owe you nothing after you have built the one job. **They are so Cheap.** They are strong and dependable forms and the lightest forms built. Don't break your back lifting forms from the wall. Let us prove these statements.

Send for our catalog

THOMPSON FORM & CLAMP CO.

Fond du Lac, Box 166 Wisconsin

SAVE CEMENT

Salvage from 5 to 10 sacks of good cement from each 1,000 empty sacks and reduce labor by one-half—by cleaning them in our

Unit Sack Cleaner

Write us for particulars.

Handy Sack Baler Co.

620 S. 2d St.,

Cedar Rapids, Iowa

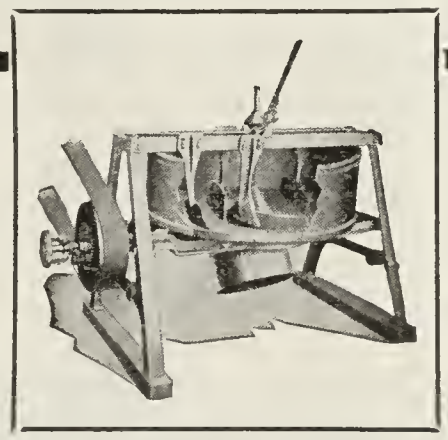
An all-round mixer for all-the-year-round work. Use it on all your concrete, mortar and plaster mixing jobs.

CONTRACTORS USE THIS MIXER ON THREE TIMES AS MANY JOBS

Portable Dunn Shovel Mixers are designed to mix mortar and plaster as well as concrete. They are built to do this work better than you ever had it done before. We want you to expect more service from it than from any other mixer. Don't be afraid of overworking it; keep it busy day after day on all of your mixing jobs. Even if you give it three times as much work to do as you would an ordinary mixer, it won't wear out any sooner.

You'll like the case by which this mixer is charged, its rapid and convenient bottom discharge, the way it cleans itself, its compactness, portability, sturdiness and dependability. Because it will mix concrete, mortar and plaster and because of its many features, you really get three mixers for the price of one. And you pay no more for it than for an ordinary mixer. Try it out for a couple of weeks before you buy.

Ask Us to Send You Bulletin T-20



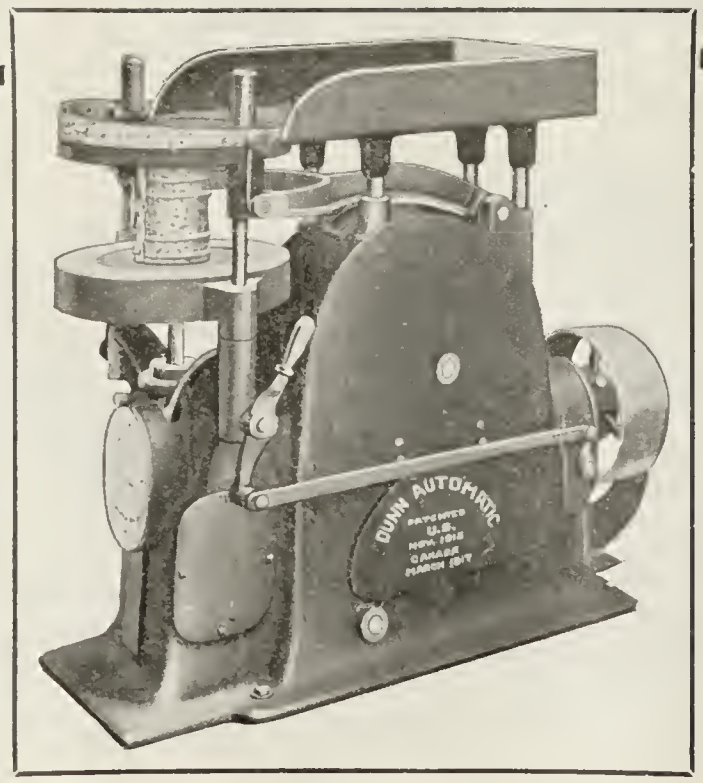
The Dunn Shovel Mixer produces a thoroughly mixed, plastic material because of its four shovels. A hundred times a minute the material is shoveled, stirred and troweled.

It not only saves the labor of one man, but it improves the quality of your products and increases your production. You may try it out before buying.

RUN YOUR PRODUCTS PLANT WITH ONE MAN LESS

With a stationary Dunn Shovel Mixer properly installed you can improve the quality of your products and increase your production with one man less than you are now employing. Simply because power and gravity are utilized to accomplish automatically what you are now doing by hand. The only labor involved in keeping your production machines, whatever they might be, constantly supplied with material is in loading a bucket below the floor level with the unmixed materials.

You'll be interested in knowing that the cost of this complete mixing and conveying equipment is less than that of the ordinary conveyor alone.



Write for Bulletin M-21

THE BUSINESS OF MAKING HOLLOW TILE

The immense demand and market for a more economical, more permanent building unit, such as hollow concrete tile, is readily evident in every community. Supplying this market means a permanent business bringing in large earnings.

It is a big part of our business to completely equip standardized plants for turning out this hollow tile and other products in large quantities at low cost. That we are able to establish you in a most profitable business is demonstrated by the success enjoyed by all Dunn Plant owners.

There's a whole lot to be said about this proposition which will interest you. Drop us a line for particulars.

W. E. DUNN MFG. CO.

414 W. 24th Street

HOLLAND, MICHIGAN

A REAL PROFIT MAKER

FLEXO CONCRETE MOULDS

Produce with extreme economy and speed the building stone that sells fastest. It is the final word in the manufacture of slush poured concrete block, plain or faced. Why limit your profits by using a system less perfect. Get behind the FLEXO-CRETE blocks and make more money out of your time and investment.

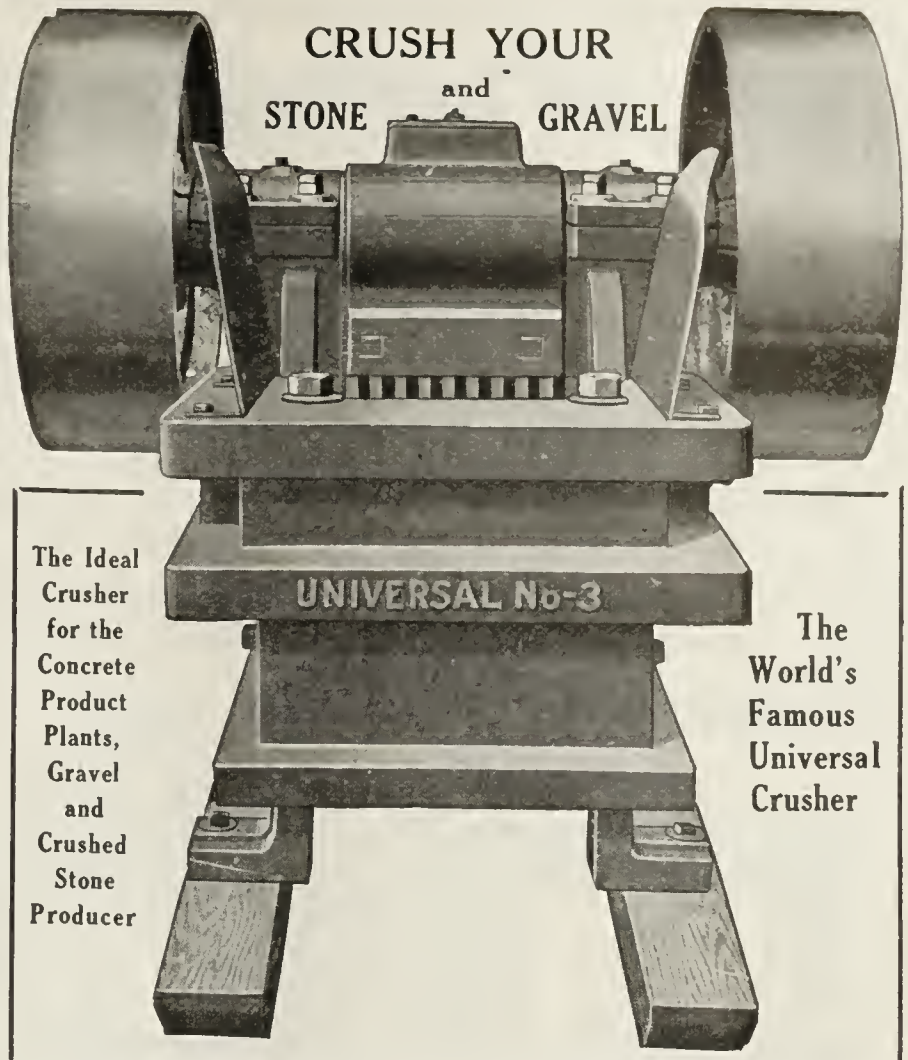
The moulds are galvanized and rust proof. All parts are interchangeable. Simple, Substantial, Self squaring and easily handled.

Flexo Moulds are manufactured under Patented Rights.

FLEXO CONCRETE MOULD CO.

216 Masonic Temple CEDAR RAPIDS, IA.

CRUSH YOUR STONE and GRAVEL



The Ideal Crusher for the Concrete Product Plants, Gravel and Crushed Stone Producer

The World's Famous Universal Crusher

We Build Crushers from 5 Tons to 300 Tons per 10-hour Capacity

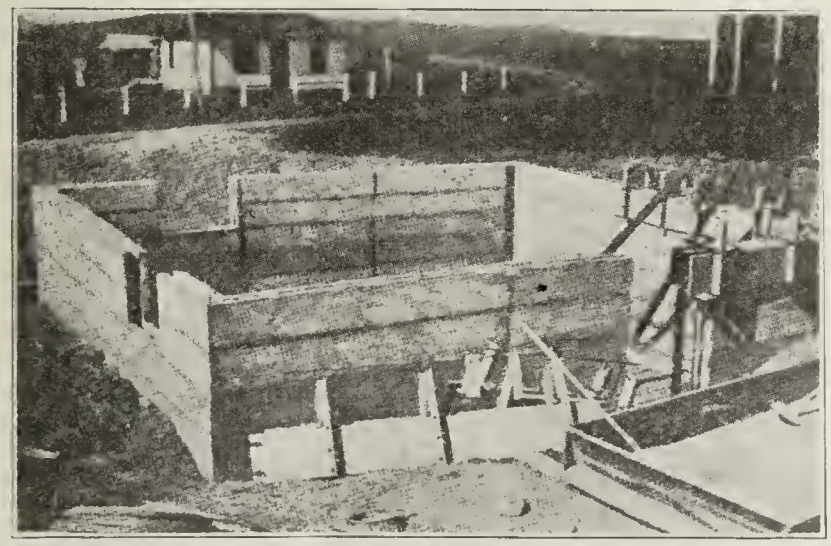
Instantly adjusted to produce size required from ¼ inch to 3 inches. *Write for Folder No. 14.*

UNIVERSAL CRUSHER COMPANY

230 Bee Ave. Cedar Rapids, Iowa, U. S. A.

FROST HOLLOW WALL FORMS

ADJUSTABLE TO ANY KIND OR SIZE OF BUILDING



With our forms you can build a double wall, reinforced concrete building to compete with the cost of frame construction.

Moisture-proof, fire-proof, repair-proof walls. Save paint, lath, time and labor to you. Save repair, fuel and insurance to the owner.

Forms adaptable to any size building, adjustable to any thickness wall. Built of poured concrete, reinforced three ways with continuous dead air space makes the most desirable method of building construction. Simple to use, easily adjustable. No skilled labor required. Method has been tried and proven.

Write for complete description of method and its operation, photos showing work done, and costs.

HOLLOW CONCRETE WALL CO.

H. T. FROST, PRESIDENT MITCHELL, SOUTH DAKOTA

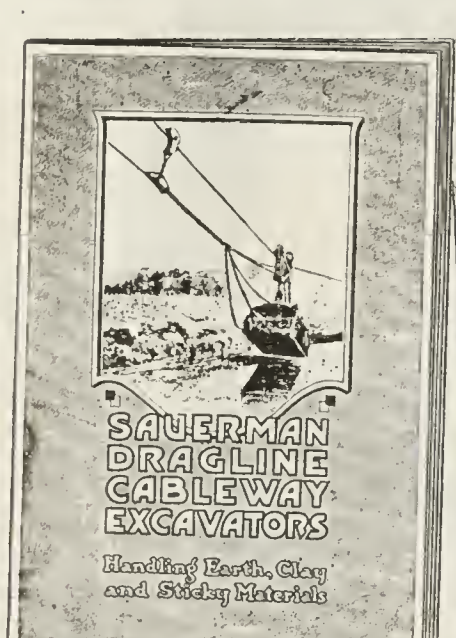
Which Do You Manufacture, Sightly or Unsightly Brick?

Make poured concrete brick, the kind of brick that are used for faced work. You can't get anywhere by calling a dry tamped brick a wet brick. To succeed you must have poured brick.

Our circular explains the difference between the poured and dry tamped concrete products.

MERRILL MOORE CRESTON, IOWA

These Booklets Are Easy to Read and Worth Reading



Pamphlet No. 15
gives details of the various types of dragline cableway excavator installations suitable for general dirt-moving operations, brick and tile plants, and so forth.

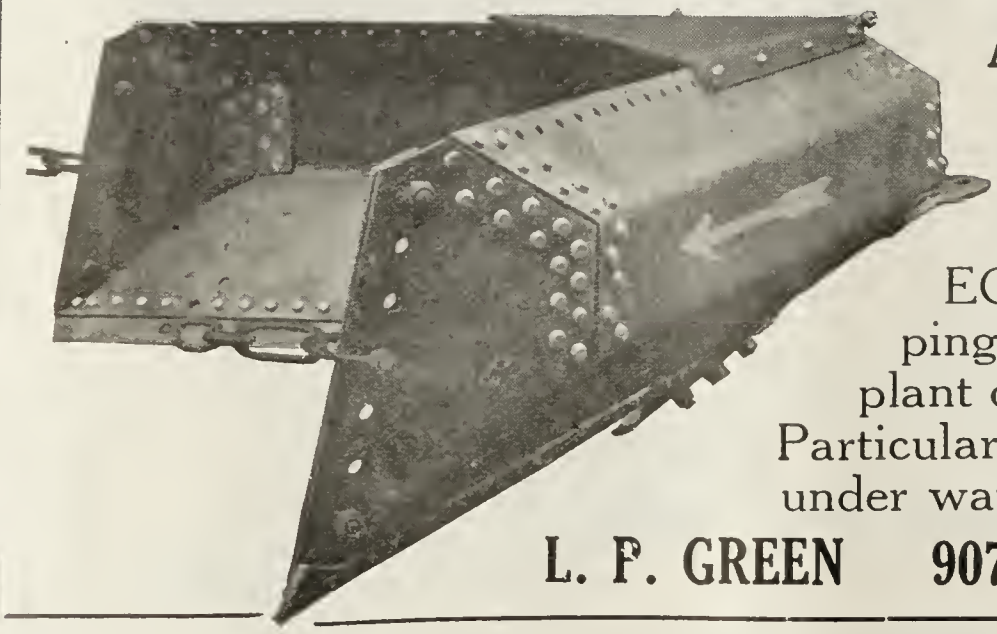
Pamphlet No. 14
is a handy compilation of data on the dragline cableway excavator method of excavating and conveying sand and gravel, illustrated with many views of typical installations.

Pamphlet No. 12
describes the latest developments in the use of mechanical drag scrapers for handling gravel from hillside, and explains the adaptability of power scrapers for small pits.

Pamphlet No. 11
illustrates practical solutions of various storage problems by use of scrapers and dragline cableways, some of this information being now published for the first time.

Which of the above pamphlets do you want? Send in your request at once.

SAUERMAN BROS. 1139 Monadnock Bldg., CHICAGO



ARROW POWER DRAG SCRAPER

A Real Earth Mover

Operated by two drum hoist. It will do excavating work of all kinds ECONOMICALLY. Grading—Stripping—Delivery of material from pit to plant or bins or for wagon or truck loading. Particularly adapted to hillside deposits or under water. Write for catalog.

L. F. GREEN 907 Lumber Exchange Bldg. Chicago

Big Profits Making Septic Tanks
BENEFIT BY OUR EXPERIENCE

After years of successful operation of a Concrete Products Plant, we have experienced in the last six months, the dullest time in its history in the sale of blocks, brick, stave silos and burial vaults. During this time the sale of our Unit System Septic Tanks has increased beyond all expectations. We are shipping them out in single shipments, and car lots, and we are four weeks behind our orders. We sell to the plumbing trade and plumbing jobbers and in some localities we have agents selling directly to the farmer and the village house-holder.

Every family who is not situated on a sewer is a prospective customer.

The profitable shipping distance is a radius of about two hundred miles from our plant, and we have decided to offer for sale to other concrete products plants the forms to manufacture Unit System Septic Tanks.

The limitations of this new business are boundless. A sewing machine agent considers two or three sales a week good business, but one of our salesmen sold eighteen installations of our septic tanks three weeks ago last Saturday, in the little village of Erie, Ill., with practically the same profit for each installation as is made on the sale of a sewing machine.

You have little or no competition in your territory. Septic tanks are sold every month in the year. Our customers are community high schools, public schools, offices, stores, churches, hotels, dwelling houses, industrial plants, etc.

Business is good with us. Let us pass these conditions on to you.

For Full Particulars Write

WM. DE LHORBE **Oregon, Ills.**

Concrete Blocks, Bricks Building Trim, Posts, Ornamental Work, Etc.
WHEN FACED WITH
Mica Spar Crystals

IS CHANGED INTO
SPARKLING GRANITE
Beautiful, Artistic and Everlasting

Made in six scientifically milled sizes, extremely hard, sharp and free from dust. Insures strength and beauty. Booklet "Micaspar and How to Use It," with free samples mailed on request.

Crown Point Spar Company, Inc.
101 PARK AVE. NEW YORK

THE *Atlas* MIXER

Represents the best established practice in Concrete Mixer Construction.

Its dependability and simplicity commends it to the contractor who appreciates the importance of uninterrupted service.

The Atlas is made in various sizes and styles. Let us mail you our catalogue.

Send for it today—NOW

ATLAS ENGINEERING CO.
3023 Lisbon Ave. **Milwaukee, Wis.**

P. S.—If you are interested in material handling equipment, let us mail you our ATLAS Wagon Loader, Box Car Loader, Car Unloader, Belt and Bucket Conveyor and Portable Storage Bin catalogue. The catalogue is yours, simply ask for it.

WATER

WE-FU-GO AND SCAIFE
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

BELTING

"V-B" Balata
"AMPERE"
(Canvas Stitched)
GRIP-ON
(Impregnated Solid Woven)

Write for Prices, Discounts and Samples
VICTOR BALATA & TEXTILE BELTING CO.
Factory: Easton, Pa. Main Office: 38 Murry St., New York
Stores: 167 N. Market St., Chicago and 85 Purchase St., Boston
CONVEYOR BELTS A SPECIALTY

"Perfect" Concrete Block Power Machine

C. S. WERT Inventor and Patentee

Also Hand and Power Brick Machines
Hand Brick Machines
Well, Cistern and Silo Molds

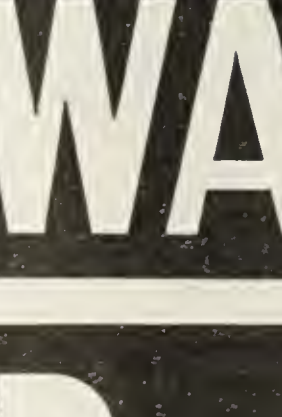
Built entirely of steel and iron.
Turns out, with four men, 1,000 to 1,200 concrete blocks in ten hours.

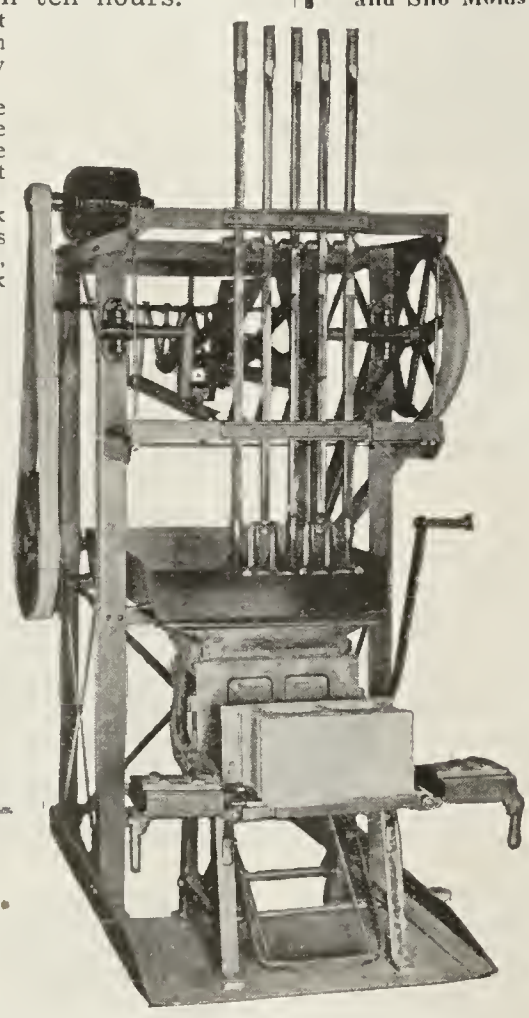
In severe tests, Perfect Concrete Brick have proven stronger than common clay and pressed clay brick.

The power tamper may be operated by a one horse power motor, a 2½ horse power gas engine or direct from a line shaft.

"There is no better brick machine manufactured," says W. T. Sharp, of Montana, owner of a Perfect brick plant.

Get facts and figures now. Write while the matter is on your mind.





Manufactured by
The Wert Manufacturing Co.
547 Railway Exchange Bldg., Chicago

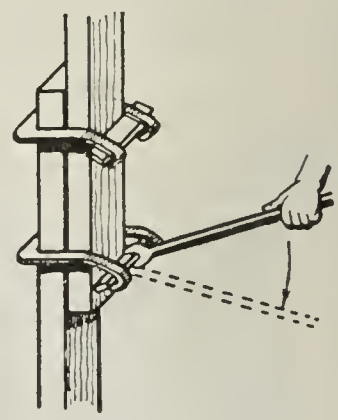
Are You a Contractor?

If you are, you will want to look further into the economy of the Schenk Patented Timber Clamp for shores. No nails are used—nor boards sawed to any required length.

Labor and loss of material are saved — important items on any job. The clamps are placed in a moment's time, and will support the heaviest pressure.

Write for our catalogs.

The Schenk Timber Clamp



Schenk's Patented Timber Clamp., Co., Ltd.
2292 Larned St. East
DETROIT

AGENTS WANTED THROUGHOUT THE U. S.

For FIRE BRICK and DUST

Specify

CRESCENT QUALITY

THE UTMOST IN FIRE CLAYS

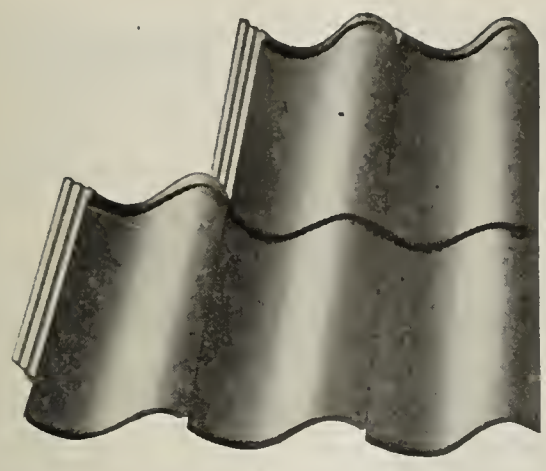
CRESCENT REFRACTORIES CO.
Curwensville, Clearfield Co., Pa.

SELECTED
WHITE SAND

UNEXCELLED FOR
Facing Concrete Blocks, Ornamental Concrete Stone, Hard Plaster, Finishing, Exterior Plastering, Roofing, Stone and Marble Sawing, etc.

Prices, Freight Rates and Samples on Application
Shipped in Paper Lined Box Cars
Small Shipments in 175-lb. Bags

Ottawa Silica Company
OTTAWA, ILLINOIS



SPANISH TILE

The U. S. Champion Tile

Is a perfect and everlasting concrete roofing of artistic beauty in any color desired. Easily made and applied by anyone.

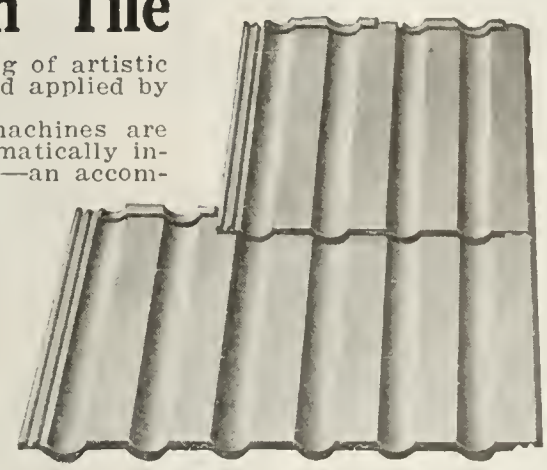
Our newly improved and patented tile machines are provided with a new device that makes automatically interlocks on both ends and sides of our tiles—an accomplishment of immense value for the roofing tile problem and characteristic for our tiles only.

Buy the U. S. CHAMPION TILE MACHINES for making FRENCH or SPANISH TILE. They help progressive builders and concrete products manufacturer cutting down the high building material costs besides giving large returns from a small investment.

Write for description and prices.

L. HANSEN CO.

3617 East 23rd St. Kansas City, Mo.



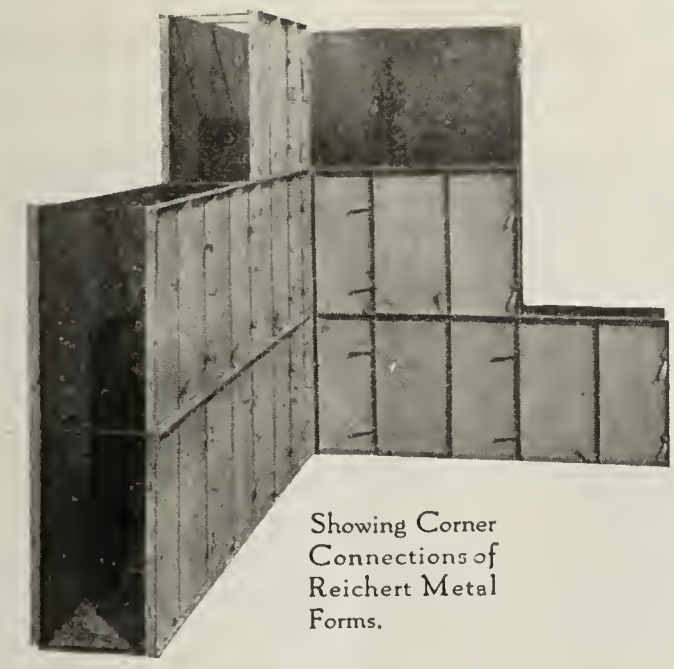
FRENCH TILE

Better Work in Less Time

REICHERT Adjustable Steel Molds will enable you to do better work on Walls and Foundations. Their perfect alignment and close connection guarantees a SMOOTH SURFACE over the entire area of the job.

REICHERT Adjustable Steel Molds will save you valuable time. The Improved Locking Device operates easily, no hammering necessary. Unskilled labor, with brief instruction, can assemble and operate with perfect results.

REICHERT ADJUSTABLE STEEL MOLDS



Showing Corner Connections of Reichert Metal Forms.

are standardized, all parts interchangeable, and PERMANENT. One set of Forms will enable you to SAVE TIME AND MONEY on a wide range of jobs, FOR MANY YEARS.

With REICHERT Adjustable Steel Molds in use, you can bid lower on contracts, beat competition, and still maintain the same margin of profit—or actually increase it.

GET THE FACTS. Write us for catalog and full information.

Reichert Metal Concrete Forms Company

1188 Weil Street, Milwaukee, Wisconsin

THE POLK SYSTEM

All-Steel Machines for All Kinds of

Circular Concrete Construction

We contract grain storages.

Polk Genung Polk Company

521 Occidental Bldg.
Indianapolis, Ind.

Fort Branch,
INDIANA

Henry Heil Chemical Company

210 to 214 South Fourth Street, ST. LOUIS, MO.

We make a specialty of supplying cement works with

Chemical Apparatus, Chemicals and Reagents

Gilmore's Needles, Cement Moulds, Vicat Apparatus, Schumann's, LeChatelier's and Jackson's Specific Gravity Apparatus, Etc.

Pyrometers, Calorimeters

High Grade Goods Only

Satisfaction Guaranteed

Sand Lime Brick Machinery

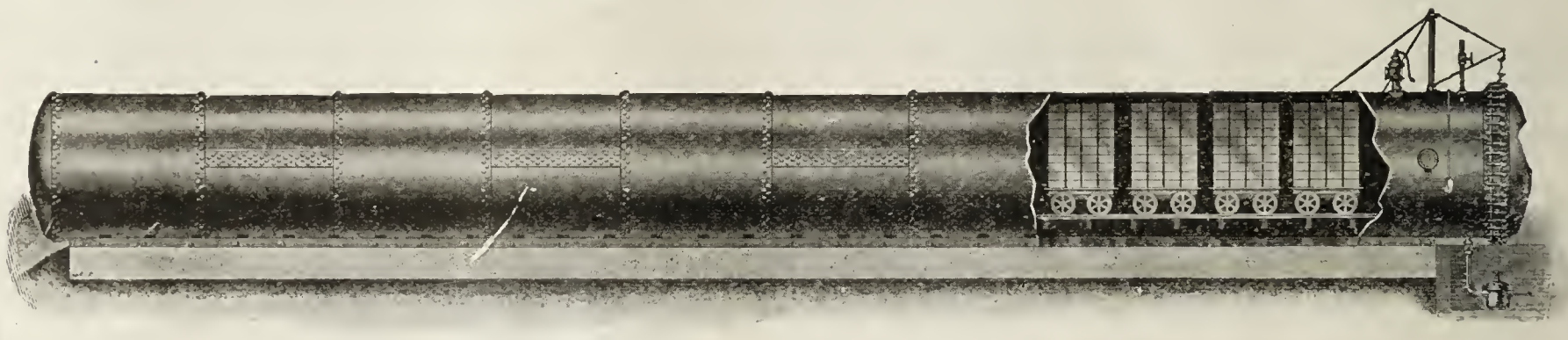
Our complete line of Sand Lime Brick Machinery makes it possible to secure just that machinery which is required to make your plant a success. We favor no particular type of machinery but are guided by the needs of the customer. Our wet and dry grinding mills have transformed a number of unsuccessful plants into dividend producers, while our Presses, Mixers, Hardening Cylinders and other equipment are of equal quality. We can exactly meet the demands of any manufacturer with a quality of machinery which will operate at a profit with a minimum amount of attention and expense.

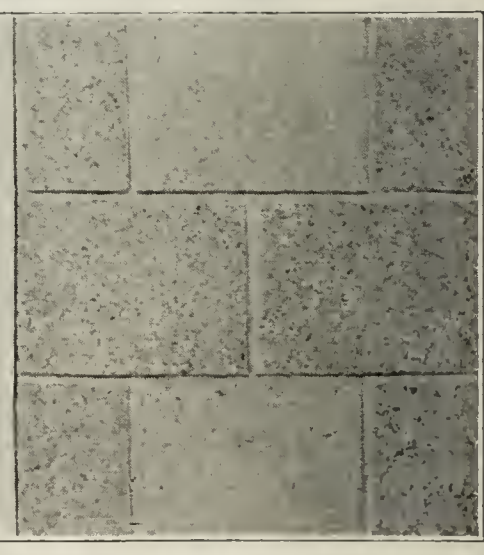
Correspondence solicited

The Hadfield-Penfield Steel Co.,

WILLOUGHBY, OHIO

Formerly The American Clay Machinery Co.





Building Material of Beauty

Minimum absorption, maximum strength, light and easy to lay and produced in style, shape and design to meet any architectural requirements.

INEXPENSIVE **PERMANENT** **POPULAR**

Under one operation the stone are veneered with granite, marble or other natural products and sprayed as they come from the machine, producing a Reconstructed Stone in natures own beauty.

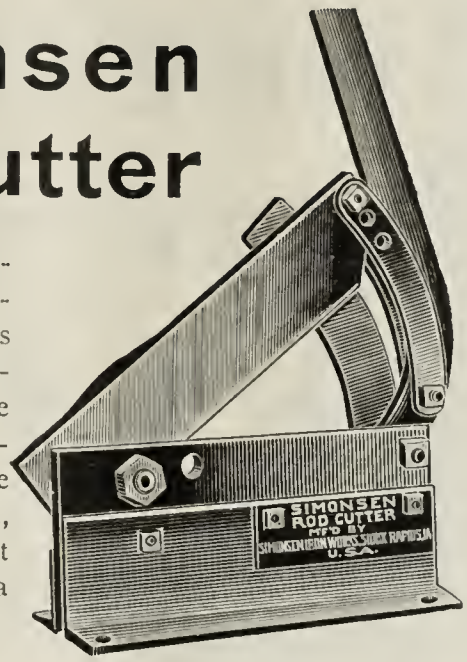
AN OPPORTUNITY

If you are interested in producing a high class building unit of standardized dimension, and desire to invest in a Real Manufacturing Business, WRITE US NOW.

HYDRAULIC RAMMING CONCRETE STONE MACHINERY

LITTLE FALLS **NEW JERSEY**

Simonsen Bar Cutter



Is designed especially to meet the requirements of builders in concrete construction needing a portable shear for cutting reinforcing bars on the job. It's a practical, low-priced shear that will pay for itself in a short time.

NON-BREAKABLE STEEL BODY

Cutting Jaws are of the "welded in" type, our own patented design. Lower or stationary jaw has a keen edge of hardened tool steel and is practically indestructible. Upper jaw does the actual cutting and is hinged at rear end on a heavy case hardened steel pin. It's reinforced.

Made in three sizes. No. 10 weight 75 lbs. Capacity ¾ in. round or ½ in. square twisted. No. 11 weight 125 lbs. Capacity 1 in. round or ¾ in. square twisted. No. 12, weight 175 lbs. Capacity 1¼ in. round or 1 in. square twisted. Shipped set up complete with suitable lever.

Ask your supply dealer or write us for full information.

SIMONSEN IRON WORKS, Manufacturers
Sioux Rapids **Iowa, U. S. A.**

Cut Gears

Spur,
Spiral,
Bevel and Worm
Steel and Rawhide

Accuracy and Prompt Delivery

When you want a gear cut you want it **quickly,**—we emphasize our promptness without sacrificing accuracy.

Ganschow Cut Gears

stand first in accuracy—perfect mesh—silent operation and the quality that counts for long service.

Estimates furnished from drawings and specifications.
WRITE FOR CATALOG.

WILLIAM GANSCHOW CO.
1003 W. Washington St. - CHICAGO

NO OTHER CLUTCH HAS ALL THESE ADVANTAGES

Plamondon Disc Type Friction Clutches have every known feature that makes toward efficiency, economy and durability in clutches. For the most economical transmission and distribution of power and easy control of the same, there can be no logical choice but that of the

PLAMONDON DISC TYPE CLUTCH

Plamondon Clutches defy the most adverse conditions Their absolutely dustproof construction renders them particularly suitable for use in cement mills, etc..

We have a 57 years' service record for this clutch.

Write for our new catalog No. 59

A. PLAMONDON MFG. CO.
5301 So. Western Blvd.
CHICAGO, ILL.

We manufacture Spur Gears, Bevel Gears, Miter Gears, Spur Mortise Gears, Bevel Mortise Gears, Miter Mortise Gears.

For Better Concrete, Stronger Mortar—use HYDRATED LIME

Increases Concrete Density

By virtue of its ability to fill the voids, Hydrated Lime increases the density of concrete. The mass becomes more watertight—practically impervious to water. Honeycomb and other structural weakness are also prevented. Hydrated Lime promotes intimate contact of the concrete mass with the forms and produces smooth, pleasing exterior surfaces.

Other Reasons Why You Should Specify and Use Hydrated Lime

because

1. Makes the mixing of Portland cement concrete more easy, inasmuch as it lubricates the sand grains and coarse aggregates.
2. Renders the concrete mix plastic enough to flow freely and smoothly with a minimum of excess water.
3. Makes the concrete easier to work after it is deposited in the forms, thus eliminating labor usually required for spading and tamping against the forms.
4. Eliminates the tendency toward cracking, because it minimizes alternate expansion and contraction due to moisture changes.
5. Promotes uniformity of the mass concrete by producing a colloidal or jelly-like medium through which the rock and matrix do not segregate, thereby producing a stronger concrete.
6. Materially and directly increases the ultimate compressive strength and efficiency of the concrete, by virtue of its ability to hold water in mechanical suspension and thus supplying the necessary moisture required by Portland cement in order properly to set and attain its maximum strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

Ladd Lime & Stone Co., Cartersville, Ga.

Marblehead Lime Co., Chicago—Kansas City

Louisville Cement Co., Louisville, Ky.

Lee Lime Co., Lee, Mass.

White Marble Lime Co., Manistique, Mich.

Glencoe Lime & Cement Co., St. Louis, Mo.

Ste. Genevieve Lime Co., St. Louis, Mo.

Rockland&RockportLimeCorp. New York—Rockland, Maine—Boston

Hunkins-Willis Lime & Cement Co., St. Louis, Mo.

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

National Lime & Stone Co., Carey, Ohio

Ohio Hydrate & Supply Co., Woodville, Ohio

Woodville Lime Products Co., Toledo, Ohio

Merion Lime & Stone Co., Norristown, Pa.

American Lime & Stone Co., Tyrone, Pa.

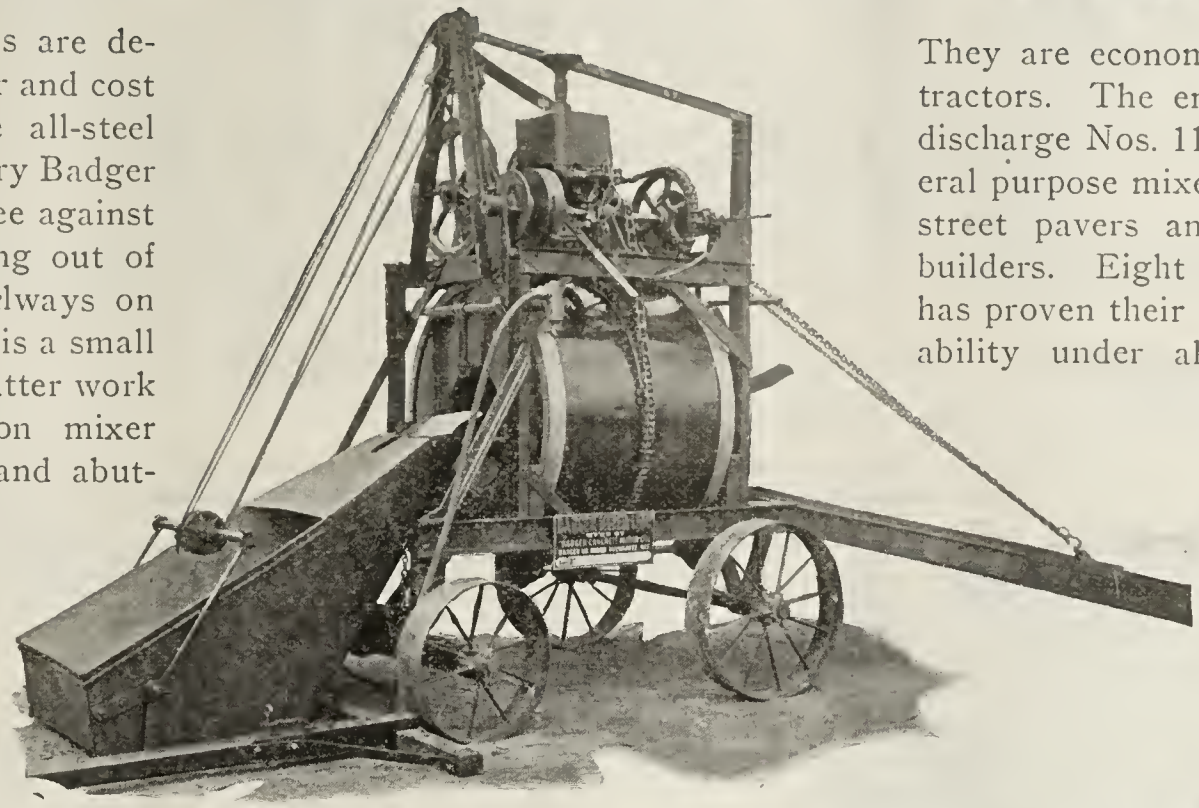
Riverton Lime Co., Riverton, Va.

Vermarco Lime Co., West Rutland, Vt.

Western Lime & Cement Co., Milwaukee, Wis.

BADGER MIXERS

The Badger Mixers are designed to save labor and cost of operation. The all-steel construction of every Badger Mixer is a guarantee against breakage or wearing out of parts. They are always on the job, whether it is a small mixer on curb or gutter work or the construction mixer upon foundations and abutments or the alley and street paver. Their light weight and durability has made a distinctive reputation for the Badger Mixer.

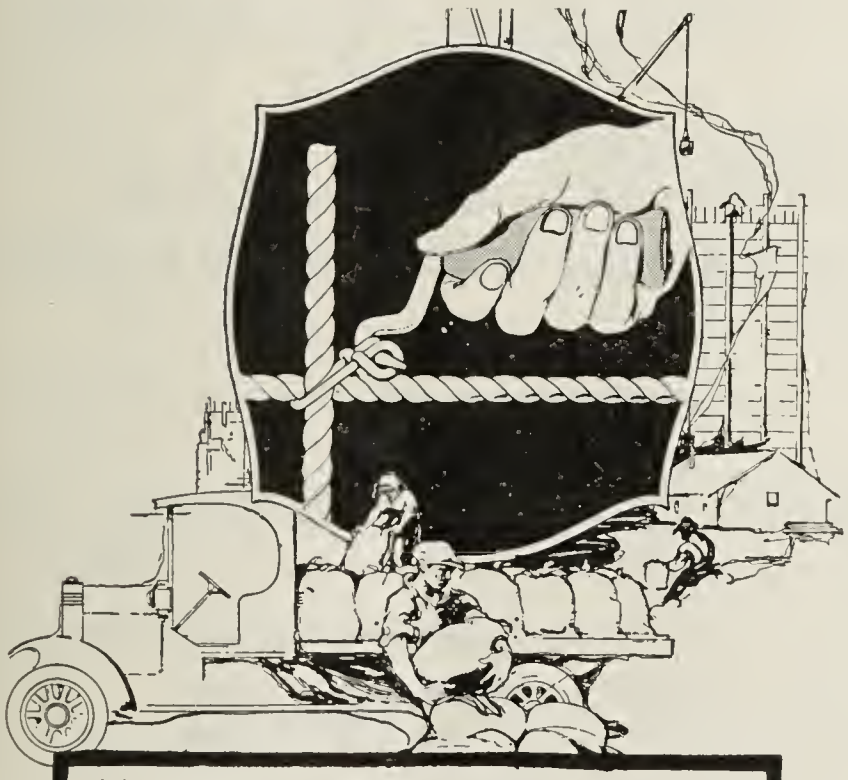


They are economical to the contractors. The end load and end discharge Nos. 11 and 15 are general purpose mixers and alley and street pavers and country road builders. Eight years of service has proven their absolute dependability under all conditions of concrete work.

Write for our attractive prices.

The ~ Badger ~ Mixer Line

BADGER CONCRETE MIXER CO., 13th Floor MAJESTIC BLDG. **MILWAUKEE, WIS.**



The Bates Rod Tying System will save money for you too

Thousands have been convinced that the Bates System of tying is the best and most economical method of rod tying. Uniformly perfect and secure tying **with speed** makes the Bates Tying System an unequalled method. Save money and do better work—

Send for this FREE Trial Bates Rod Tying Outfit

The Bates FREE Trial Rod Tying Outfit, containing one "Simplex" Hand Tying Tool and 20 each of 4, 5, 6 and 7-inch Bates Wire Ties, will be sent on receipt of your signed agreement to try this Rod Tying Outfit on your work, and then, within fifteen days, send us $1.50 or return the tool. These trial ties cost you NOTHING.

BATES VALVE BAG COMPANY

7330 South Chicago Ave., Chicago, Ill.

BATES SYSTEM FOR FILLING & CLOSING BAGS

110 Great Portland St., London, W. I., England

Contractors can't afford to be without

The Waterloo Bar Bending Machine

It's made in 2 sizes, and is guaranteed to bend bars as follows: No. 2 bends cold reinforcing bars including 1⅛ in. round or square. Price $30.00. No. 3 bends cold reinforcing bars including 1¼-in. round or square. Price $35.00.

Bends bars to various angles desired. Has a detachable handle 7 feet long for convenience in handling.

Waterloo Construction Co., Waterloo, Iowa

SAVE CEMENT SACK LOSS

Bale your sacks up tight and right. Keep them baled up all the time. If you have one of our handy sack balers you will do this. We manufacture a cleaner that cleans. Write us for prices and further information.

HANDY SACK BALER CO
620 S. 2d St.
CEDAR RAPIDS IA.

CLOSED—For Storing or Transporting.

ECONOMY STEEL SCAFFOLDING

is being used by a number of leading Chicago contractors, such as Thompson Starrett Co., R. C. Wieboldt, Blome Sinek, E. W. Sproul & Co., Math Rauen Co., Gerhardt Meyne and many others, who will gladly recommend them to every contractor as a good asset in equipment.

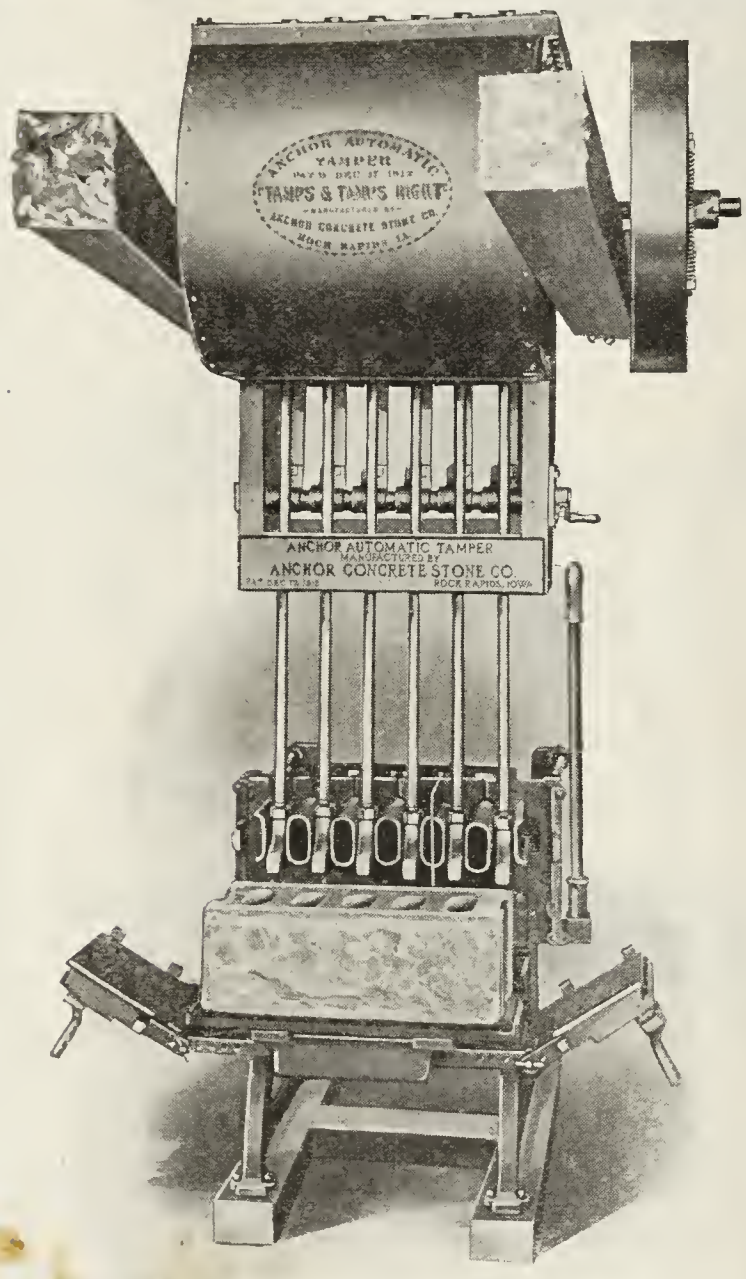
The illustration is of the Mason Horse 4 ft. 6 in. high and 5 ft. 0 in. wide which weighs but 60 lbs., they are sturdy in construction and their compactfulness when folded makes them very easy to handle, transport or store.

A TRIAL ORDER WILL CONVINCE YOU THAT THEY ARE A NECESSITY.

Price $6.00 each, F. O. B. Chicago.

ECONOMY SCAFFOLD CO.

4611-19 West Fulton St. **CHICAGO, ILL.**



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ANCHOR AUTOMATIC TAMPER

will make money for you if you will give them a chance. The finest faced blocks in the world can be made on the Hobbs machine and yet this same machine will make plain blocks very rapidly.

The Anchor Automatic Tamper is made to operate over any type of Block, Brick or Stave machine with satisfaction absolutely guaranteed.

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1 CONCRETE MIXER, Ideal No. 264, 4 H.P., capacity 7 cu. ft.

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Made from Middlebury White and Crême Statuary Marbles, it is furnished, carefully graded to size, in either dust, No. 1, 2 or 3.

Send today for free samples and prices

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2—5'6"x20' Schmidt Tube Mills Complete. For full particulars address **Phoenix Portland Cement Co., Nazareth, Pa.**

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6,000 gallons	8′	3" x 15′ 0"
8,000 gallons	10′	0" x 12′ 0"
10,000 gallons	10′	0" x 17′ 0"
10,000 gallons	7′	10" x 30′ 0"
12,000 gallons	7′	10" x 35′ 0"
12,000 gallons	10′	5" x 18′ 0"
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1—Pump 1 Feed water heater, all belting, shafting, pulleys and 2 overhead hoists.

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15—40 in. gauge, 2-yard, all steel, special built end dump cars, $200 each.

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One—Westinghouse Leblanc Condenser.
One—16 KW Exciter outfit.

All in first class condition. For full particulars address

Phoenix Portland Cement Co., Nazareth, Pa.

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1—No. 4 and 1—No. 6 Allis Chalmers Gyratory. First Class Shape.

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3—8¼x10 Lidgerwood D. C., S. D. Heavy Duty.

Dump Cars, Locomotives, Rails.

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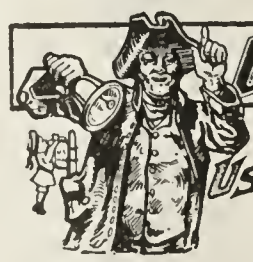

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SUCTION FILTER

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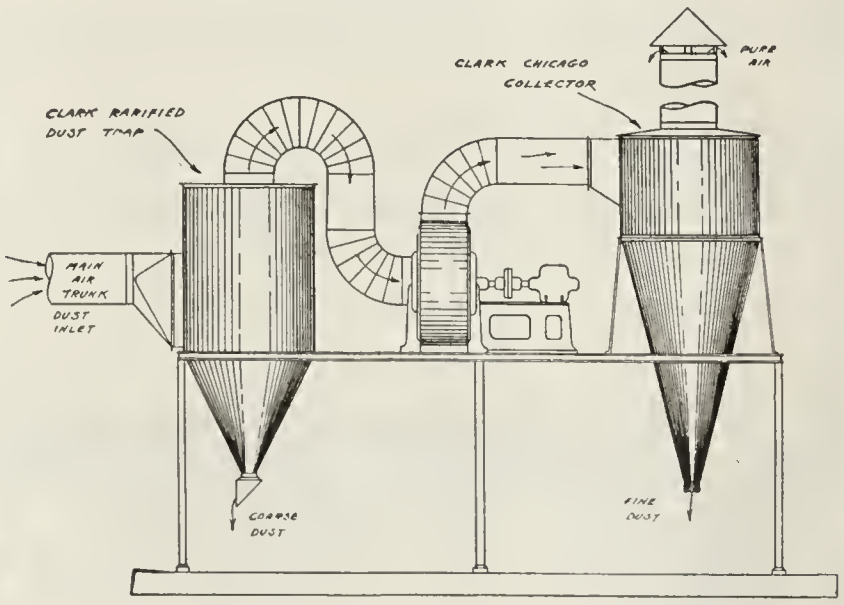
OUR ALL METAL SYSTEM



The Clark All Metal System consists of Clark Chicago Collector, Fan and Adjustable Air Separator. This system can be used for the collection of dust of any kind. Occupies minimum space. Durable and efficient. The Clark Adjustable Air Separator insures longer life to the fan by separating the abrasive dust ahead of the fan, making two classifications of dust collected.

All Metal Systems reduce your fire and explosion hazards, insure longer life to your machinery and a better day's work from your employees.

Write us if you are interested in Pneumatic Conveying or Dust Recovery Problems

CLARK DUST COLLECTING CO.

Dust Collecting Engineers

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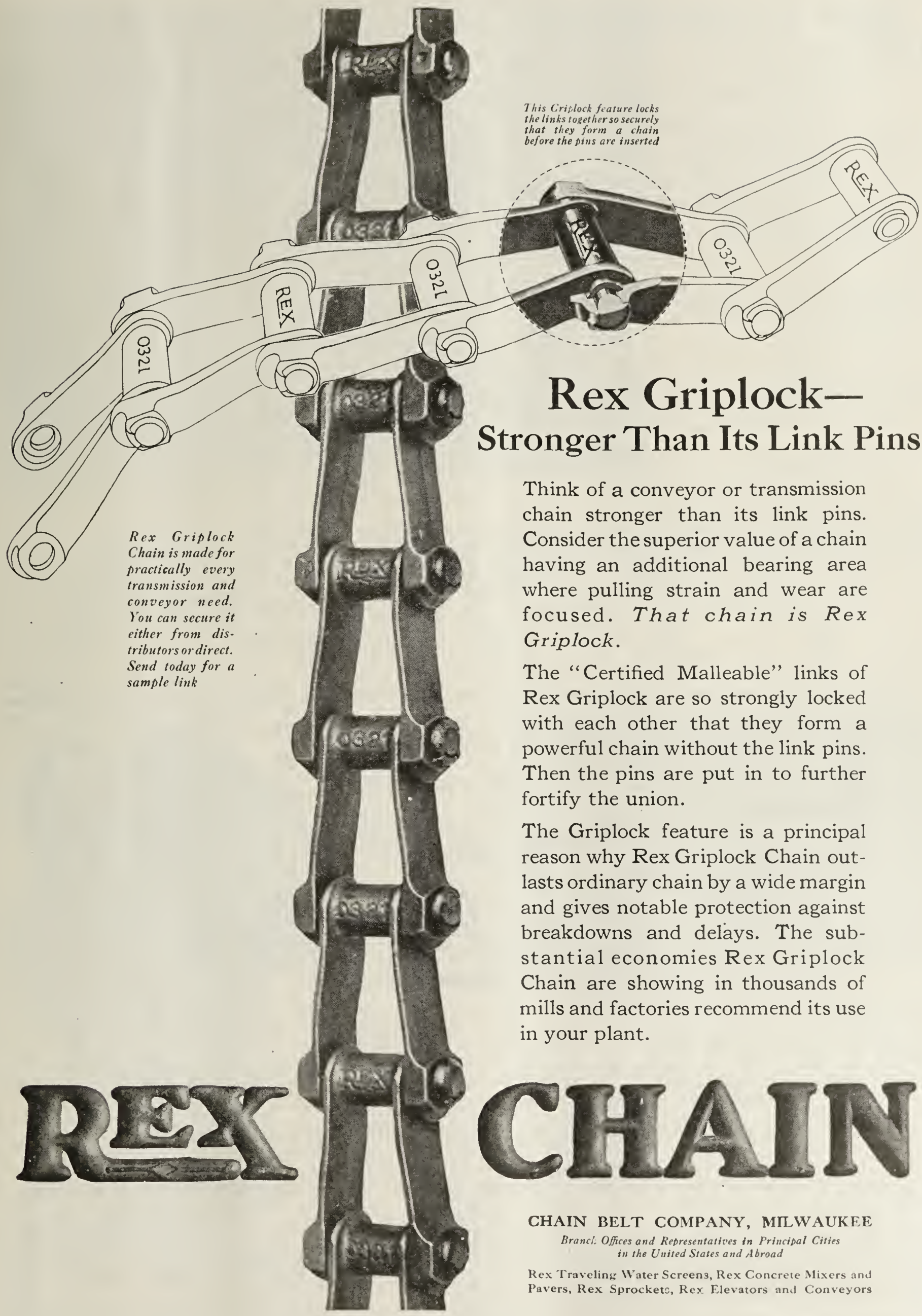
A Dust Collector Which Pays for Itself

By purifying the air which the men breathe in this plant, thus increasing their efficiency, and by salvaging the dust removed from the air, this Allis-Chalmers Dust Collector has paid for itself in a very short while. This device is installed in Hillsville, Pa., plant of the Carbon Lime Stone Company.

To collect the dust and keep itself in "collecting condition"—that is the problem solved by the A. C. Style B Dust Collector.

Ask for Bulletin 1454-O

ALLIS-CHALMERS
MILWAUKEE, WIS. U.S.A.



This Griplock feature locks the links together so securely that they form a chain before the pins are inserted

Rex Griplock Chain is made for practically every transmission and conveyor need. You can secure it either from distributors or direct. Send today for a sample link

Rex Griplock—
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Think of a conveyor or transmission chain stronger than its link pins. Consider the superior value of a chain having an additional bearing area where pulling strain and wear are focused. *That chain is Rex Griplock.*

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The Griplock feature is a principal reason why Rex Griplock Chain outlasts ordinary chain by a wide margin and gives notable protection against breakdowns and delays. The substantial economies Rex Griplock Chain are showing in thousands of mills and factories recommend its use in your plant.

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Branch Offices and Representatives in Principal Cities in the United States and Abroad

Rex Traveling Water Screens, Rex Concrete Mixers and Pavers, Rex Sprockets, Rex Elevators and Conveyors

CEMENT AND ENGINEERING NEWS

with which Gravel & Stone Magazine is Incorporated

22 Quincy Street, Chicago.

(PUBLISHED MONTHLY)

William Seafert, *Publisher and Editor*

J. F. Waldron, *Advertising Manager*

R. M. McCully, *Business Manager*

Telephone, Harrison 5397 Cable Address, "Seaferts" Chicago

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Advertising copy or changes in ads. must be in this office by the 25th of each month, as hereafter our magazine will appear on the 5th of the following month

Advertising Rates Sent on Application

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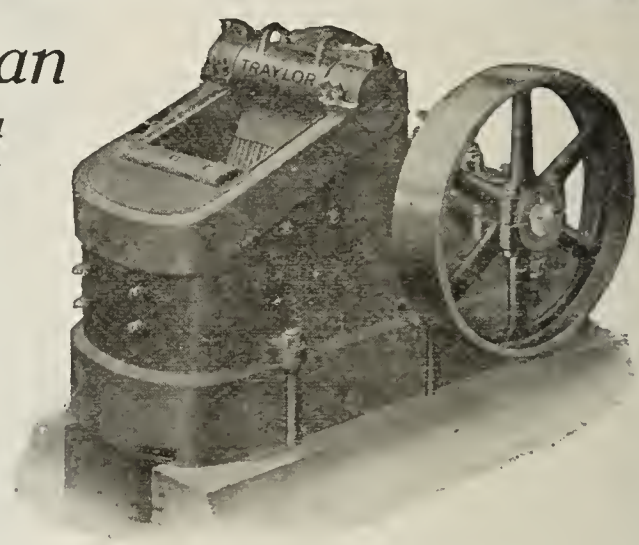
Traylor "Bulldog" Jaw Crushers Mean a Saving at Any Crushed Stone Plant



One method of designing crushers is to make them so massive throughout that it is practically impossible for them to be subjected to strain. Yes, they crush but the cost of operation is terrific.

Traylor Engineers strove to design the lightest yet the strongest crusher possible, that's why the frame of every "Bulldog" Jaw Crusher has a steel band shrunk on it top and bottom and all are equipped with the "Bulldog" Toggle system, the pitman of which is by far the lightest yet strongest of its kind being; made of wrought-steel tension members.

And it's this fine balance of weight and strength that makes the "Bulldog" crusher so economical to the user. Ask your neighbors about the power costs of their "Bulldog" Crushers.

TRAYLOR ENGINEERING & MFG. COMPANY, Allentown, Pa.

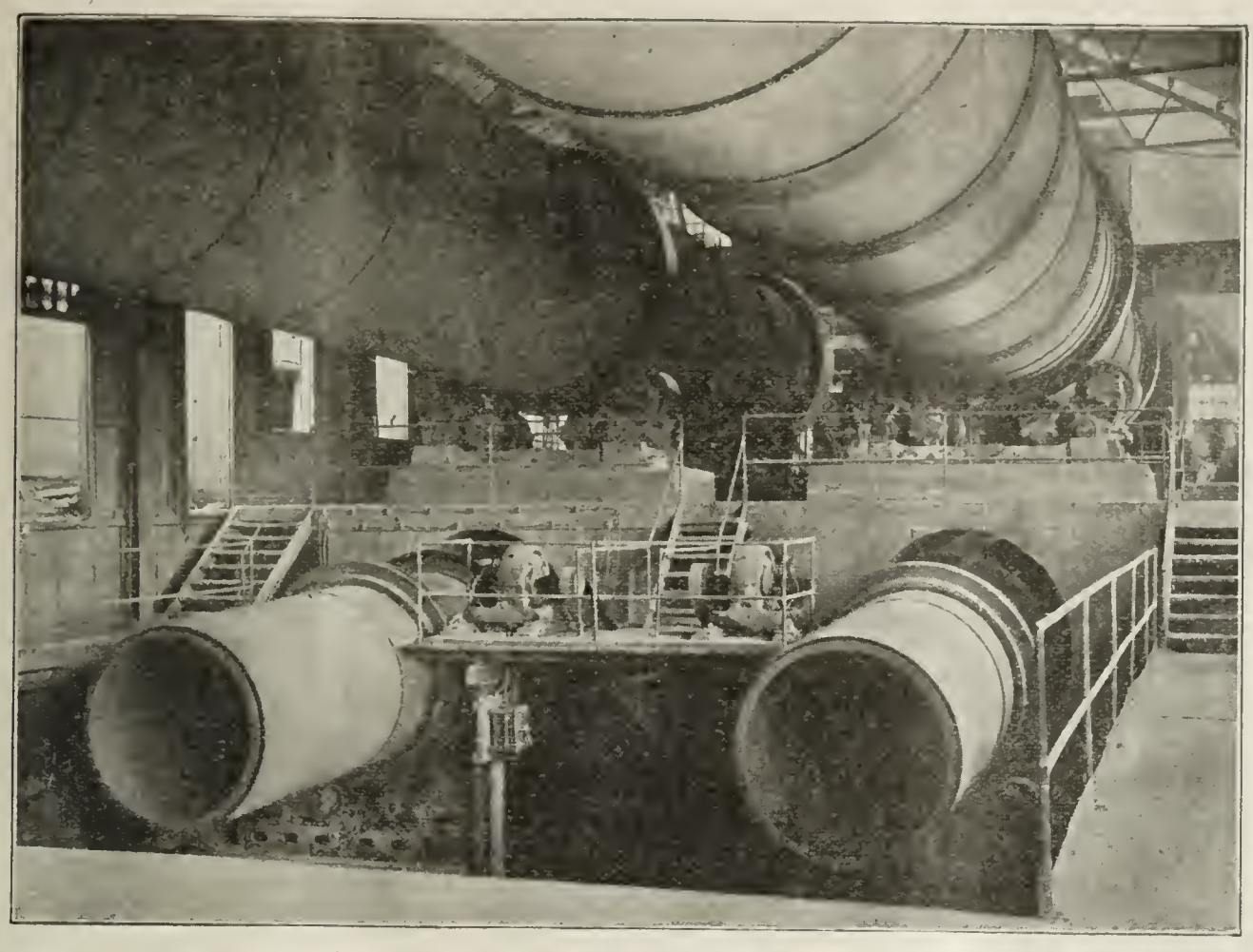
New York Chicago Pittsburgh Los Angeles Spokane

Truck and Tractor Division, Cornwells, Bucks Co,. Pa.

For Immediate Delivery

10 in. x 20 in. Type "A" Jaw Crusher
14 in. "Bulldog" Gyratory Crusher
No. 7½ Gyratory Crusher
36 in. x 16 in. Type "A" Crushing Roll

And the Same Economy That's Found in Traylor "Bulldog" Crushers is Built in Traylor Motor Trucks and All Purpose Tractors



10'x175' KILNS AND ROTARY COOLERS

TYPICAL
ILLUSTRATION
OF DESIGN
AND
CONSTRUCTION
OF

KILNS

AND

COOLERS

FOR
MODERN
CEMENT PLANTS

BULLETIN 1457
AT YOUR REQUEST

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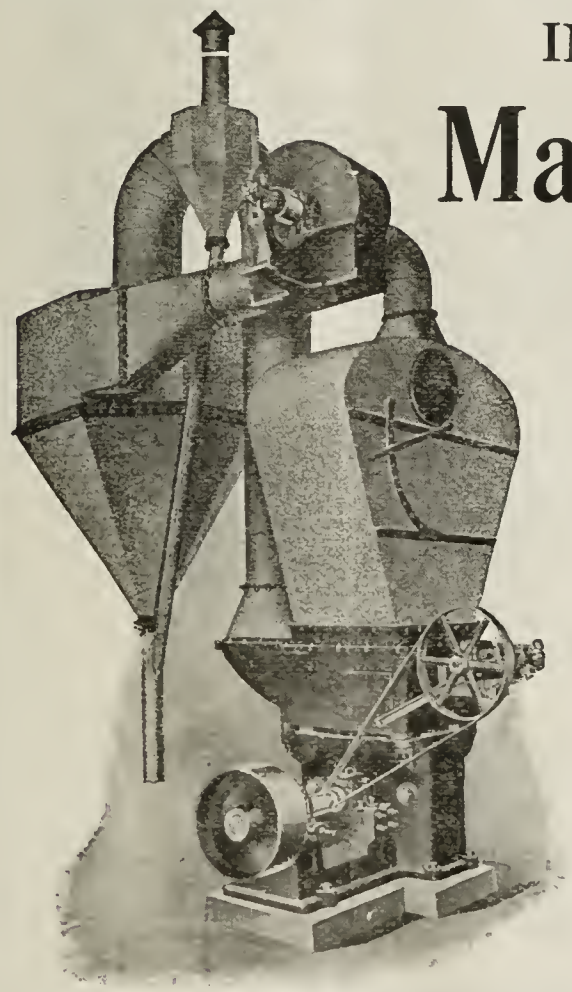
MILWAUKEE, WIS. U. S. A.

Complete Grinding
IN ONE
Machine



In successful use
grinding
Cement, Clinker,
Limestone, Coal

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REGULATION
OF
FINENESS

NO DUST

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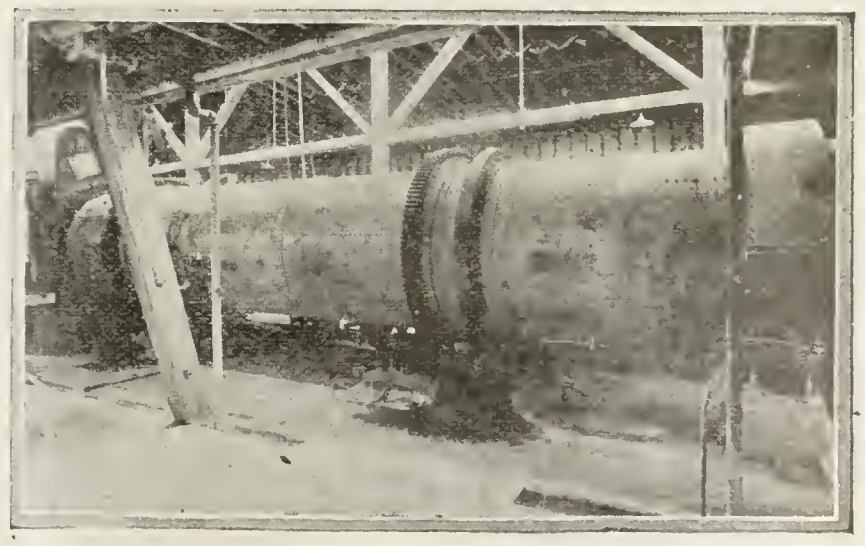
CANTON, OHIO



Coal Should Be Dry Before Being Pulverized

Some coals are sufficiently dry as they come from the mines, but others, and these are in the majority, must be dried before being pulverized.

The Ruggles-Coles Double Shell Dryer has been the standard coal dryer for years. It is found in every industry and every part of the earth where pulverized fuels are used.

The design prevents the possibility of fire or explosion.

The operation is dustless, insuring a clean and healthy plant.

Ruggles-Coles Engineering Company
120 Broadway New York

Ruggles-Coles Dryers

The Bradley Hercules Mill

Built for the Preliminary Pulverizing of Cement Materials

In Operation at the Largest and Most Successful Cement Plants Since 1913 —More Popular Than Ever and More Successful

13 Mills Sold to Pennsylvania Manufacturers
Other Installations in Tennessee—New York—North Carolina—
Illinois—Oklahoma—California—Washington—Cuba—Argentine

It's the largest preliminary machine manufactured adapted for pulverizing Cement Rock, Limestone or Clinker.

One manufacturer with two mills ground 170,000 barrels Clinker in one month—another manufacturer has averaged 40 tons per hour, when grinding Limestone over a period of several years of operation.

It's a Wonderful Labor and Power Saver

Our Engineers will gladly show you how this mill will reduce your present operating costs, using your present tube mill equipment, and increase your output.

BRADLEY PULVERIZER COMPANY

Works: Allentown, Pa. **BOSTON, MASS.**

Manufacturers of Pulverizing Machinery for 30 Years

ROTATORS *are* SMOOTH-RUNNING

Bill (7 years old) is drilling a 2 ft. hole in hard sandstone at the Noonan Quarry at Randwick, New South Wales.

The drill is working under full pressure (note dust around the hole). The photograph (unretouched) shows almost no vibration, as shown by the sharpness of Bill's hands, of the hose, and of the drill itself.

This smooth action is made possible by the careful designing, the close working fits and the accuracy with which Rotators are machined and assembled.

Limit gauges insure perfect interchangeability.

Steel shanks of improper length often cause excessive vibration. Be sure that your shanks are exactly 3¼ in. long, and any youngster can run the Rotator easily.

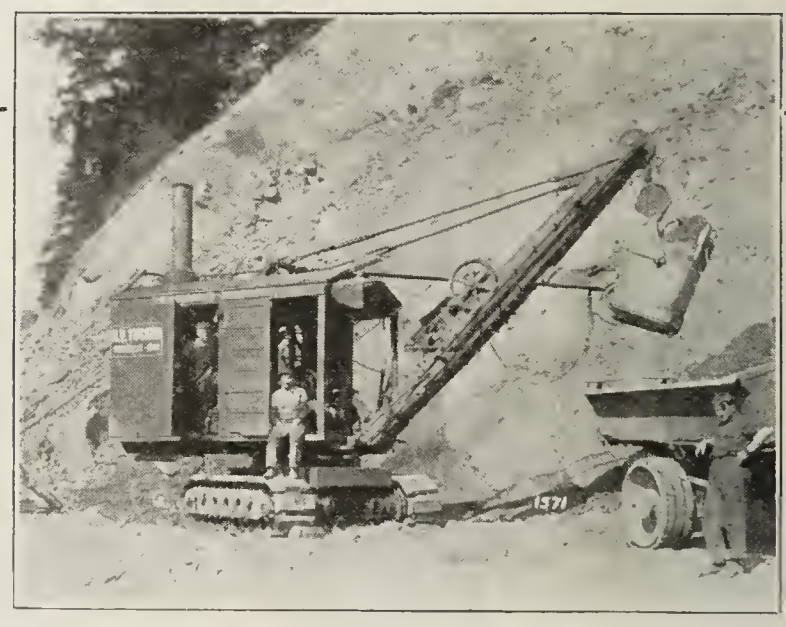
Bulletin 1770-J.

SULLIVAN MACHINERY COMPANY
418 PEOPLE'S GAS BLDG. CHICAGO, ILLINOIS U.S.A.

DOMESTIC SALES OFFICES:
Birmingham, Boston, Butte, Claremont N. H., Cleveland, Dallas, Denver, Duluth, El Paso, Huntington, W. Va., Joplin, Juneau, Knoxville, New York, Pittsburgh, St. Louis, Salt Lake, San Francisco, Spokane.

FOREIGN SALES OFFICES:
Algiers, Brussels, Cobrutta, Christiania, Durban, Natal, Havana, Lima, London, Madrid, Mexico City, Paris, San Juan, Santiago, Shanghai, Sydney, N. S. W., Tokio, Toronto, Tunis, Turin, Vancouver.

SULLIVAN PRODUCTS
Air Compressors; Air Lift Pumps; Diamond Drills, All-Hammer Drill Sharpeners, Drill Steel Furnaces, Forge Hammers, Ironclad Coal Cutters, Rock and Hammer Drills; Quarrying Machinery, Contractors for Diamond Core Drilling



When investing your money you will do better with

OSGOOD

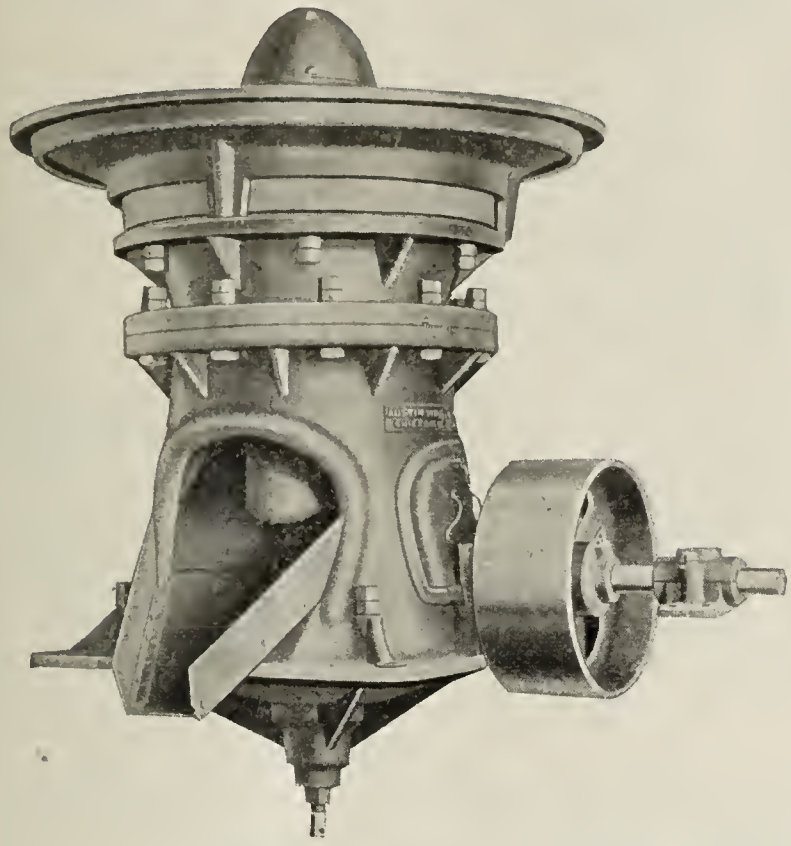
QUALITY—SERVICE

Investigate their superior features now.

WRITE, PHONE OR WIRE

Revolving Steam Shovels ¾ and 1 yard.
Railroad Type Steam Shovels 1½-6 cu. yards.

THE OSGOOD COMPANY, MARION, OHIO., U.S.A.



ALWAYS AN INVESTMENT
NEVER AN EXPENSE

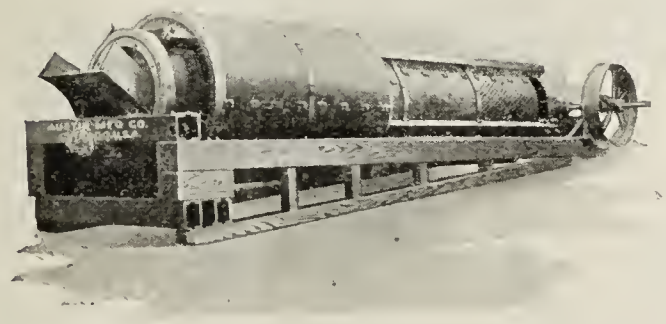
AUSTIN GYRATORY CRUSHERS

are always on the job, year in and year out, doing their work efficiently and economically.

Their purchase is a real investment—one that pays big dividends in service and satisfaction and in money as well.

Made in stationary and portable types and in eight sizes having hourly capacities of from 5 to 500 tons.

Catalog 28-D is yours for the asking



Austin Manufacturing Co.

New York CHICAGO San Francisco

CANADIAN AGENTS:
Mussens Limited: Montreal, Toronto, Vancouver
Canadian Fairbanks-Morse Co., Limited:
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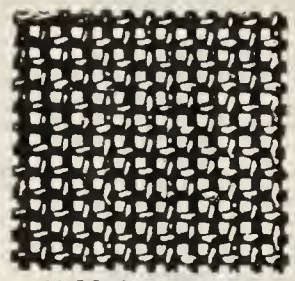
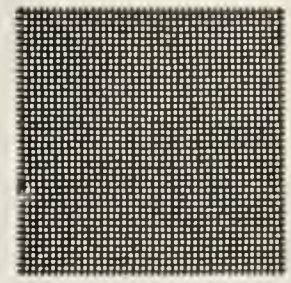
EXPORT DEPARTMENT
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
51 Chambers St. New York U.S.A. Cables Almacoa New York

Cleveland Double Crimped WIRE CLOTH

2½ Mesh; .105 Wire



12 Mesh; .047 Wire



40 Mesh. .0135 Wire

You should use our screens because a uniform fineness of screened product is assured by an even, accurate mesh. This is a characteristic of "Cleveland" Double Crimped Wire Cloth.
Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

The Cleveland Wire Cloth & Mfg. Co.
3579 E. 78th Street, CLEVELAND, OHIO

FABRICATED STEEL PRODUCTS

We specialize on FABRICATED STEEL PRODUCTS and are equipped to furnish steel plate products such as Tanks, Hoppers, Stacks, Conveyors, Chutes, Pipe, Elevator Legs, Coal Mine Equipment, Cement and Concrete Sheet Steel forms promptly. Let us estimate on your requirements.

CORRUGATED SHEETS ERECTED

We are specialists in furnishing and erecting ROOFING & SIDING of Galvanized, Painted or Zinc sheets, corrugated or formed. Our mechanics are experts—they know how. Let us figure on your erection no matter where located.

Our complete stock of Galvanized, Black, and Blue Annealed Sheet Steel and Zinc enable us to give immediate attention to all orders and inquiries received.

THE SYKES COMPANY

930 W. 19th Place CHICAGO

"WE ARE GLAD"

TO RECOMMEND

GRUENDLER

AUTOMATIC PULVERIZER

"Because it has proven beyond doubt its Reliability, Speed Power and Dependability.

"These are the reasons why we gladly recommend the Gruendler crusher and pulverizer, which we have been operating in our plant for the past four years. Its repair costs are unusually low, it requires very little power and it turns out a clear uniform product with great rapidity. We are well pleased with our Gruendler pulverizer."

(Signed) W. D. GEARHART, Mgr. Illinois Limestone Co.,
Robinson, Ill.

EQUIP YOUR CRUSHED STONE PLANT WITH A

GRUENDLER

AUTOMATIC PULVERIZER

It will increase your output, lower your costs and deliver a more uniform material.

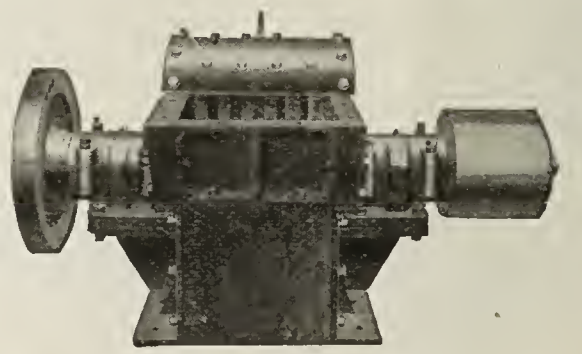
A powerful mill, built for long service and uses less horsepower, giving greater capacity due to our improved features, Ball-Bearings and Sledge Hammer Principal. Our price is right.

"35 years of square dealing our guarantee." Built in standard sizes, 3 tons to 3,000 tons daily.

Literature describing each model in detail ready for you. Send today.

GRUENDLER PATENT CRUSHER & PULVERIZER CO.

904 No. Main St.
ST. LOUIS, MO.



PLANT OF THE ILLINOIS LIMESTONE CO.

Quality of Taylor Mesaba Steam Shovel Chain Is Shown by Its Service Record

TAYLOR MESABA

A large number of contractors and cement, lime, crushed stone and sand and gravel producers—both large and small—have found from actual experience that the dependable service always obtained from Taylor Mesaba Steam Shovel Chain enables them to keep their output up and their operating expense down.

Taylor Steam Shovel Chain is a product of many years of practical chain making.

Every individual link is correct in size and shape, smooth finish, swedged to long taper, welded on end, with length of weld not less than twice the diameter of the iron.

These details are watched by master workmen, whose life work is the making of good chain.

Sizes carried in stock—¾″, ⅞″, 1″, 1⅛″, 1¼″, 1⅜″, 1½″, and 1⅝″. When you need chain for strain, order Taylor Mesaba.

S. G. TAYLOR CHAIN CO.

144 SO. DEARBORN ST. CHICAGO

BALLS

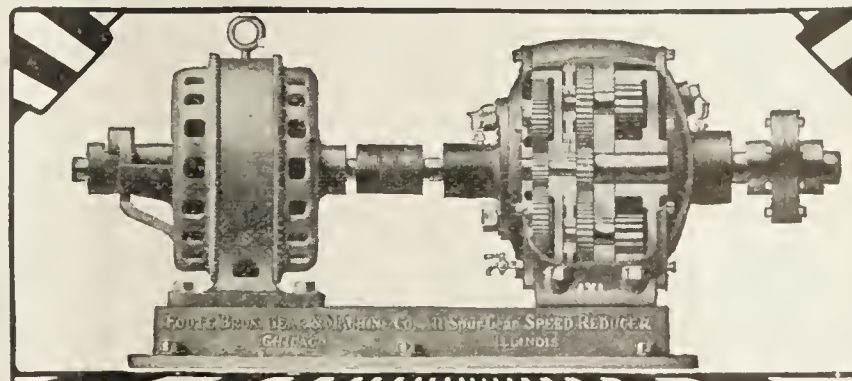
Forged steel balls of special analysis steel from 2″ to 15″ in dia. carried in stock. Can't be excelled.

BALL MILL PLATES
CRUSHER SHAFTS
GRIFFIN MILL SHAFTS
GRIFFIN MILL CONVEX SEATS
GRIFFIN MILL CROSSHEADS
PIPE FLANGES
For High Pressure Work
STEAM SHOVEL, TRUCK AND CAR AXLES

Hammer and Hydraulic Press Forgings of all Kinds

We make quick service a feature of our business

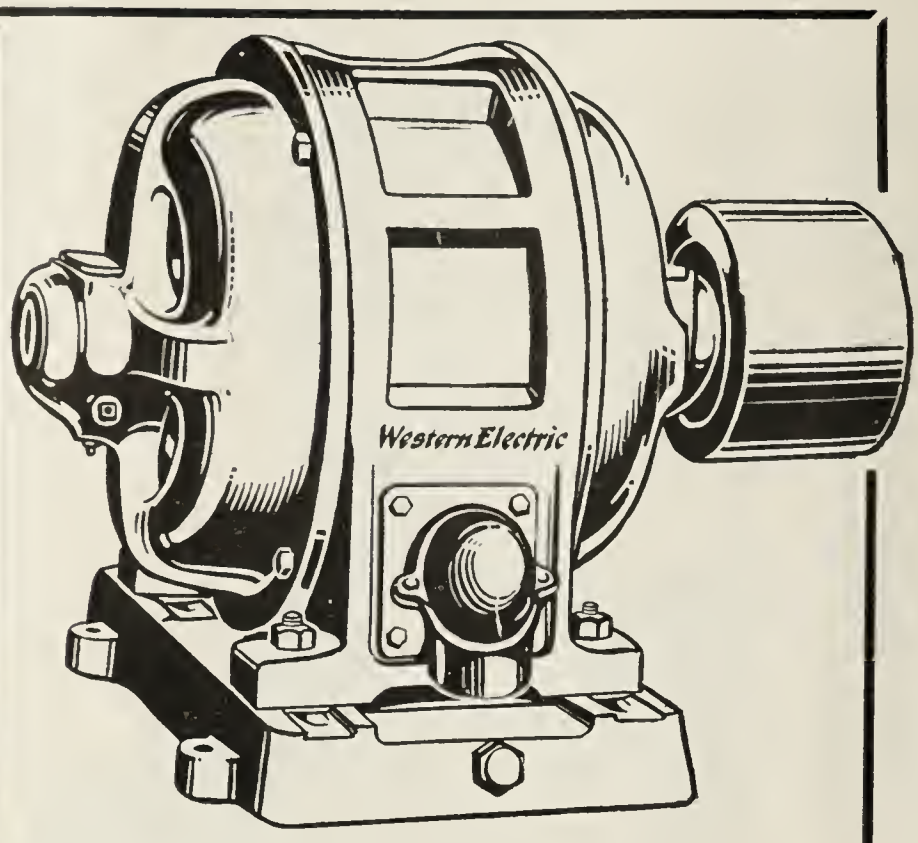
TIOGA STEEL & IRON CO.
52nd AND GRAY'S AVENUE, PHILADELPHIA, PA.



FOOTE SPEED TRANSFORMERS

Write to us, state the conditions that exist in your plant, and get the advice of our engineering department.

FOOTE BROS. GEAR & MACHINE CO.,
228-238 N. Curtis St. Chicago, Ill.



DID YOU EVER STOP TO CONSIDER

That we have spent years of our time on your electrical problems? Years of untiring efforts which embraced university training, laboratory tests on material, plant analysis, etc? We offer you today the services of men from our organization who can carry your problems through to a successful issue, can meet your emergency just the same as we met others.

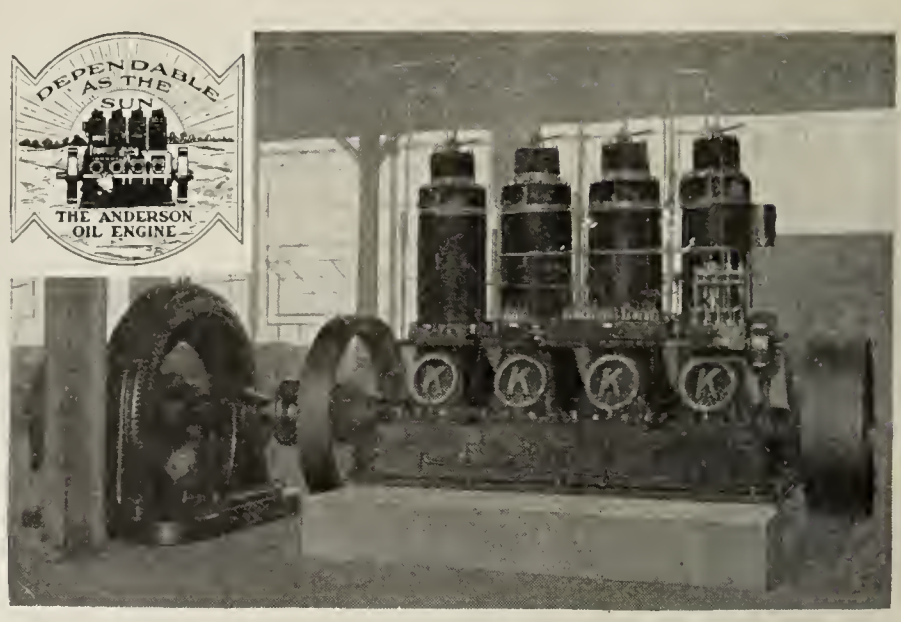
We are specialists in Motor Designing, Motor Building, Coil Building and Power Surveys. The knowledge we have gleaned after making a thorough study of cement mill plants and their operation, the experience we have gained through making the cement industry our choice of operations and our factory facilities we offer you now. We know we can be of aid to you and we also know you have your electrical problems to solve.

An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States.

Lansing Electric Engineering Co.

All the Name Implies

Lansing, Michigan



225 H.P. Type K Anderson Installation.

NEW ANDERSON TYPE K OIL ENGINES

Meet Every Power Requirement

Reliable | **15 to 225 H. P.** | **Efficient**

S imple to operate.
E ndures years of use.
R uns in either direction.
V ertical, proper construction.
I nterchangeable parts.
C an use small foundation.
E xacting speeds.

E asily accessible.
C an guarantee saving.
O perates on less fuel.
N o valves or trappy attachment.
O perates with less repairs.
M oney saved.
Y ear's guarantee.

Write for Catalogue and Information.

ANDERSON FOUNDRY & MACHINE COMPANY
A.F. & M. Co.
FOUNDED IN 1872 CAPITAL $1,400,000.00
ANDERSON, INDIANA, U.S.A.

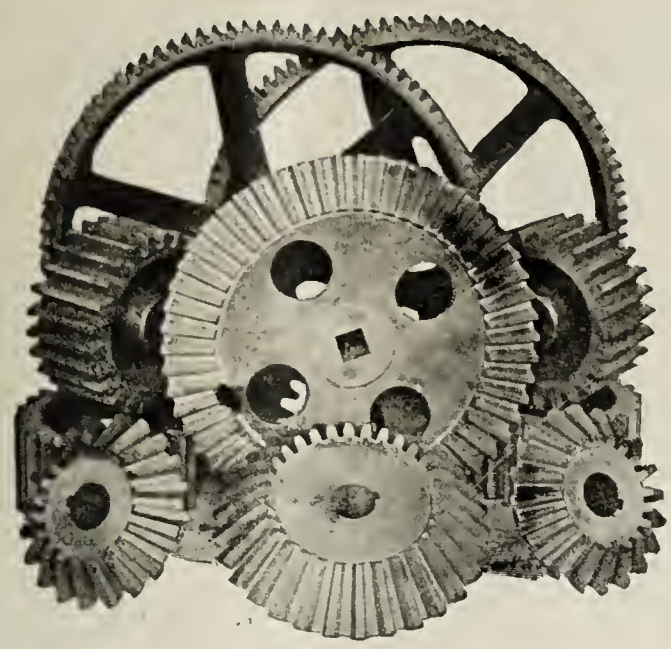
PERFORATED SCREENS

Made to suit your requirements. Advise diameter, length, thickness and size of perforations required.

NORTMANN DUFFKE CO.

1220 27TH AVE.

MILWAUKEE - - WIS.



More Than Ordinary Gears

Nuttall **BP** gears have proved to be the highest quality gears that the engineering field has yet produced for the various industries, including the cement industry and the brick industry.

Their superiority lies in their great strength and wearing qualities. The life of **BP** gears, even in those industries where gear service is of the severest nature, has proved to be four times that of untreated gears in identical service.

Specify Nuttall **BP** gears and renew your gears four times less frequently. **BP** gears can be furnished for any cement and brick plant requirement.

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

Nuttall

BATES
VALVE BAGS
INSURE SAFE DELIVERY

If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

THE VALVE BAG CO. OF AMERICA
TOLEDO, OHIO

Analyze Your Drilling and Blasting!

Our new Blast Hole Catalog B-46 (96 pages) will help you.

The day of poking a hole down with a rivet header or a converted hay bailer is past.

Drilling, being the first step in stone production, is the most important. One cent or one half cent per ton cost saved in this operation often eliminates competition.

With Cyclone No. 14 Drills on the job and Cyclone Service in reserve, your drilling and blasting troubles fade—and your costs will be right!

THE SANDERSON-CYCLONE DRILL CO.
ORRVILLE, OHIO.
Eastern and Export Office: 30 Church St., New York.

Makes Quarry Operation More Safe and Decreases Blasting Costs

Big blast hole drills are used for blast holing, cutting a 5-5/8 inches hole at the new wet process plant and quarry of the Oklahoma Portland Cement Co. illustrated and described elsewhere in this issue of Cement & Engineering News. The company uses 5 drills, 4 of which are steam driven and one electric. Eventually, all of the drills will be electrically driven. The holes are drilled 14 ft. back from the face and 14 ft. apart, the average number of holes being 90. Two or three rows are shot at one time, the rows being staggered. The holes are charged with 50% gelantine dynamite on the bottom and 40% on the top, the proportion being 1 to 4. All of the rows are shot at one time with Cordeau-Bickford detonating fuse which makes the operating of the quarry more safe and decreases the blasting costs.

Cordeau-Bickford detonating fuse is particularly adapted to well drill blasting where large columns of explosives are fired, where it is desirable to break the charge in the drill hole or where a great many holes are to be fired at one time. Cordeau is run from the top to the bottom of the drill hole in continuous contact with the explosive charge—one continuous detonator.

Results! Complete detonation, quicker detonation, greater shattering effect, lower secondary costs, substitutes a detonator which is insensitive to shock and friction in place of the electric caps.

Write for booklets on Cordeau and Deep Well Blasting

THE ENSIGN-BICKFORD CO., SIMSBURY, CONN.

Original Manufacturers of Safety Fuse

World's Largest Lime Plant is Vulcan Equipped

THE new potash plant of the Eastern Potash Corporation, near New Brunswick, N. J., is equipped with ten 8x125-ft. oil fired VULCAN KILNS.

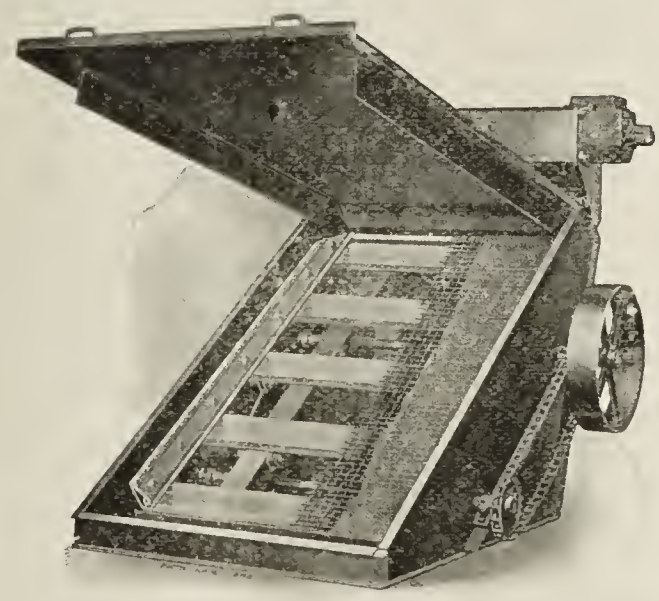
In an industry where the possibilities are practically unlimited, the best possible equipment is naturally desired. The thorough knowledge of VULCAN engineers and the thoroughness of VULCAN workmanship inspires the confidence of those who desire the best.

VULCAN IRON WORKS

Established 1849

1740 Main Street **Wilkes-Barre, Pa.**

STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY



"Bucking Broncho" Separator

A plant that tries to screen without a "Bucking Broncho" has yet to know true screen efficiency.

A simple, durable, inclined screen, built upon principles never before attempted, and which has proved a remarkable success. It not only has all the vibratory motion of other screens, but also has many others, not heretofore utilized. It not only has the ordinary up and down motion, but has a further to and fro and lateral motion, as well as a rotating motion, together with many slaps, jars and shakes. This tremendous amount of vibration not only screens the material far better than any former device, but also considerably augments its capacity per square foot of screening surface.

Its screening surface is not stretched, yet it cannot sag even if one stands upon it, because it is held up by the coarse foundation wires, resting on the saddle.

CRUSHERS—GRANULATORS—GRINDERS—PULVERIZERS—
SCREENS—MIXERS—ELEVATORS—CONVEYORS—CHUTES

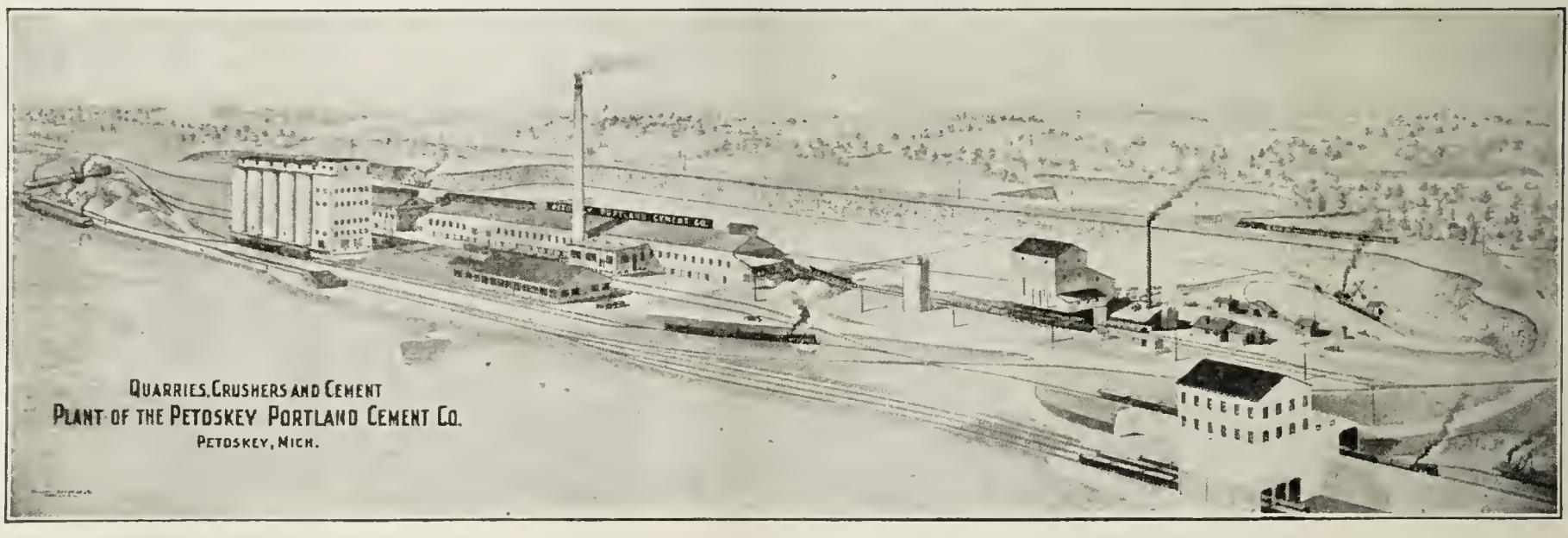
STURTEVANT MILL CO., BOSTON MASS.

HARRISON SQUARE

NEW YORK, SINGER BLDG. CHICAGO, PEOPLES GAS BLDG. PITTSBURGH, 1ST NAT'L BANK BLDG. ATLANTA, HEALEY BLDG.

THE KILNS IN THE NEW PLANT OF THE
PETOSKEY PORTLAND CEMENT CO.

are lined with high grade fire brick furnished by The Davis Fire Brick Company.



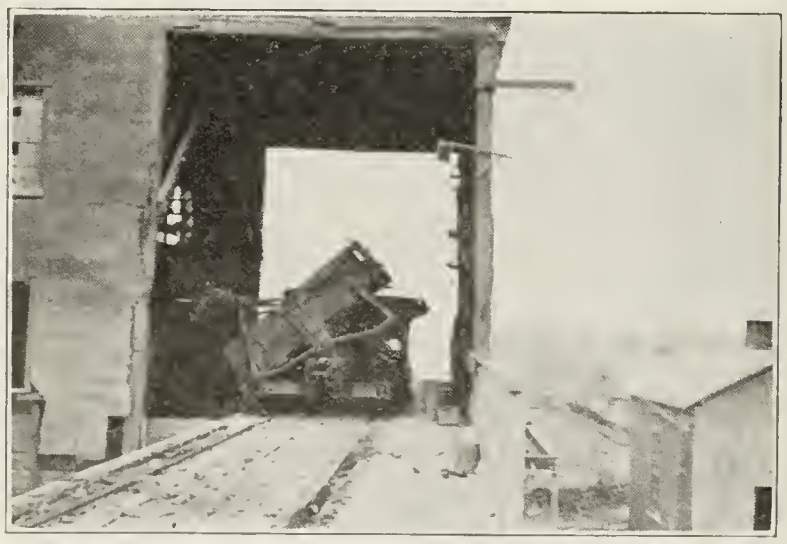
QUARRIES, CRUSHERS AND CEMENT
PLANT OF THE PETOSKEY PORTLAND CEMENT CO.
PETOSKEY, MICH.

We devote a special department to the manufacture of brick particularly adapted both physically and chemically to cement kiln construction. Large stock carried. Prompt shipments made.

Write for quotations on standard and special shapes.

THE DAVIS FIRE BRICK CO.
OAK HILL, OHIO

Dump Cars in Cement Manufacture



Northwestern States Portland Cement Company's Western 6-yd. dump cars at crusher.

Western

That's Why

Portland Cement Plants are installing Western 6-yd. dump cars, where standard gauge equipment is desired, and Western 4-yd. or 5-yd. cars, where narrow gauge.

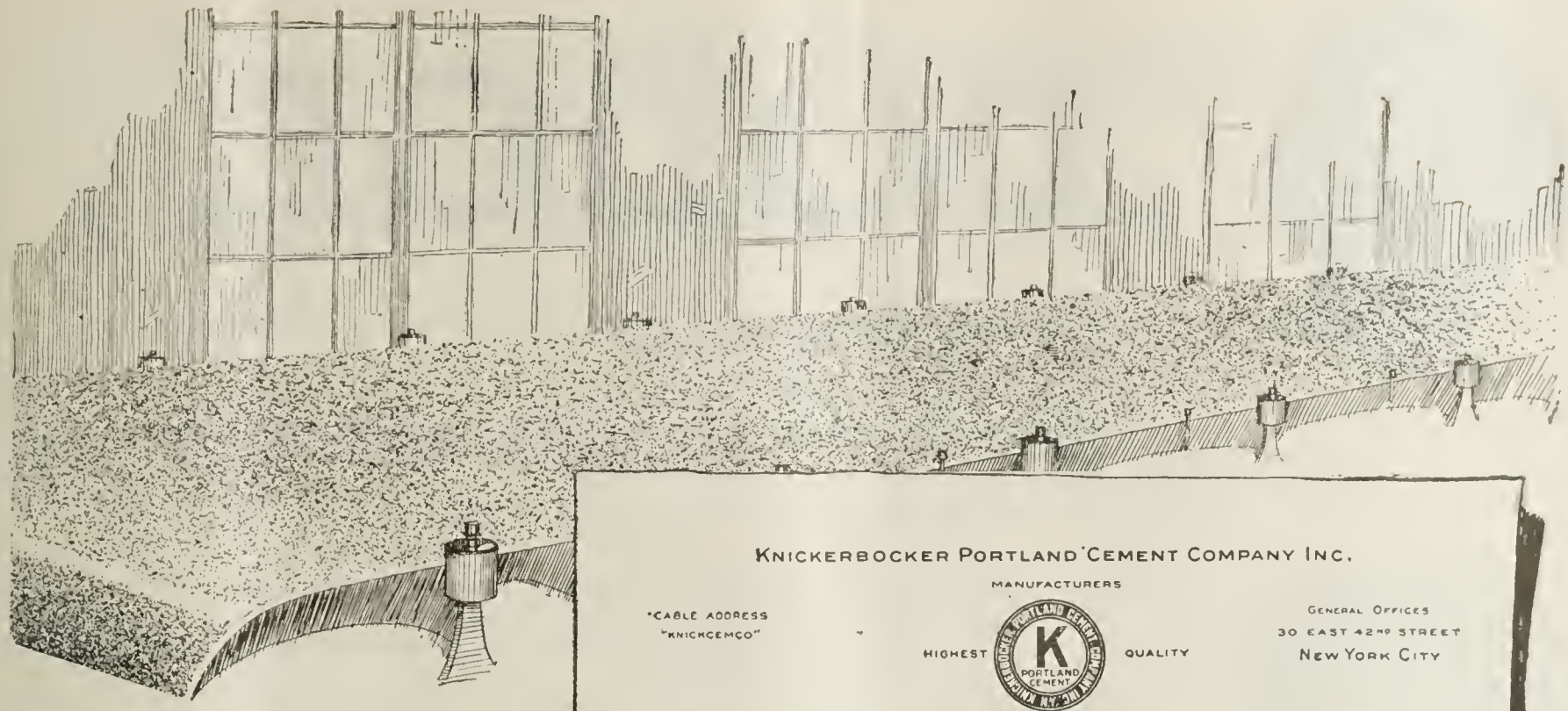
Local conditions determine the size of car, but almost invariably it is a **Western**—for stripping, for handling shale and often for handling stone.

The Lehigh Portland Cement Company, in stripping off shale, dumps a train of six 4-yard Western cars in from 17 to 25 seconds, without stopping the train, and keeps it up all day.

Whatever your haulage problem, there is a Western car that will solve it. Let us help if we can.

Write Today

Western Wheeled Scraper Company
Earth and Stone Handling Equipment
Aurora, Illinois



KNICKERBOCKER PORTLAND CEMENT COMPANY INC.

MANUFACTURERS

"CABLE ADDRESS "KNICKCEMCO"

HIGHEST K PORTLAND CEMENT QUALITY

GENERAL OFFICES 30 EAST 42ND STREET NEW YORK CITY

HUDSON, N.Y.

July 20,1921.

R.D.Skinner & Co., Inc.
150 Nassau St.,
New York, N.Y.

Gentlemen:

On December 26,1920, we placed in service a conveyor requiring 680 feet of belting, 20 inches wide. This conveyor belt had to handle hot cement and to make a test of the various beltings, we used two pieces of standard rubber belting manufactured by the best rubber belting companies and one piece of Lion Paw belting purchased from you and made by the Buckner Process Company. To-day, I made a thorough inspection of the three different kinds of belting and found that the rubber belting is deteriorating rapidly. The rubber cover is cracked, because it is becoming vulcanized. I do not believe the rubber belting will last more than 8 months longer. The Lion Paw is in first-class condition and looks to be practically as good as when it was first put into service. I firmly believe that this Lion Paw belt will last at least twice as long as the rubber belt.

There is no question about the superiority of Lion Paw over rubber belting in handling hot cement and I personally would not purchase anything but Lion Paw for this class of work.

Very truly yours,

O.E.Nassoi

Superintendent.

OEW:S

KNICKERBOCKER FOR STABILITY

LION PAW BELTING

THIS letter from one of the country's large cement manufacturers speaks for itself. Lion Paw makes an excellent conveyor belt because

It never cracks or becomes stiff.

Its interwoven construction, internal lubrication and special coating prevent grit, dust and crushed stone particles from penetrating.

It resists heat, acid fumes and water.

Its tensile strength and wearing qualities are exceptional.

A trial of Lion Paw Belting will make you as enthusiastic as the writer of this letter. Lion Paw will cut belting costs in *your* plant.

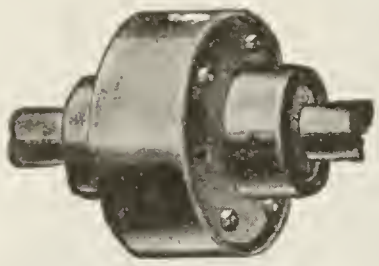
Write for samples, prices and the terms of our guarantee.

LION PAW BELTING

R.D. Skinner & Co. Inc. 150 Nassau St., New York City

DODGE
Flange Coupling

DODGE
Compression Coupling



SHAW
Compression Coupling

DODGE
Ribbed Coupling

Flexible Coupling

DODGE

Couplings for lineshaft service everywhere

One style of shaft coupling cannot fill all requirements everywhere; conditions and individual opinions are too widely varied.

If you are prejudiced in favor of any one type of coupling, Dodge will provide you with the best coupling made in that type.

If you desire the opinion of Dodge engineers as to the proper type or types of couplings to use on any job, it will be gladly given, will be absolutely unbiased and will provide for operating economy in every way possible.

But whether you buy couplings on a preference basis or select them at our suggestion, be sure that they bear the name "Dodge." Only in this way are you certain of having the best.

Dodge Sales and Engineering Co.

General Offices: Mishawaka, Ind.
Works: Mishawaka, Ind., and Oneida, N. Y.
Canadian Plant:
Dodge Mfg. Co. of Canada, Ltd., Toronto and Montreal

Philadelphia Cincinnati New York Chicago St. Louis Atlanta
Boston Pittsburgh Minneapolis Houston Seattle Newark

DODGE

Power Transmission Machinery

Cement and Engineering News

Vol. 33 Chicago, September, 1921 No. 9

Front View of Flats

Unique Flat and Bungalow Court Faced with Stippled Stucco

The Flat and Bungalow Court shown in the accompanying photos follow oriental lines as to design and are faced with stippled stucco of a creamy white color.

At the front and facing the street stands the main building, a four-flat structure with two five-room suites on the first floor and two six-room suites above. The ground drops sharply just back of the main building and concrete steps go down to the other two structures, or bungalows each of which contain a single suite of five rooms. The court enclosed by the buildings, drops down in a series of terraces to a garden and pool.

Back of the bungalows there is a community garage, the roof of which is utilized as a roof-garden. Access is had to the roof garden over an arch leading from the rear of the court.

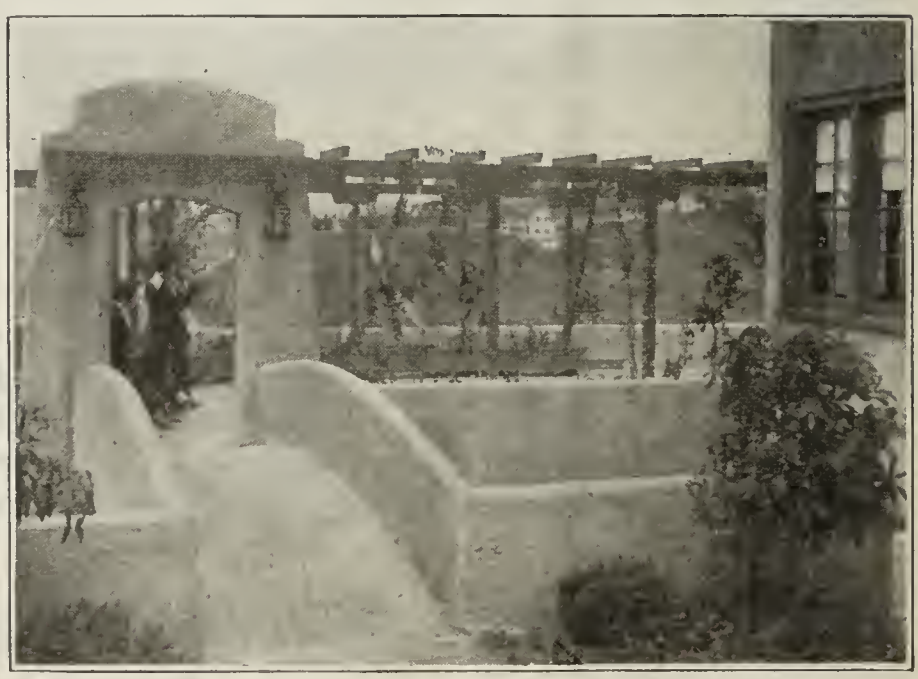
View from Rear

The structure from the rear, resembles an ancient castle, in some respects, while other features remind one of the ancient Cliff-dwellings.

Artistic and practical utilization of a hillside site has been made in the building of the Flat and Bungalows. The lot faces east and slopes steeply down to the west. It has a frontage .of fifty feet increases in width to eighty feet at the back and has a deph of 166 feet. Both the street slope and the irregular shape have been used to advantage.

In the accompanying photos No. 1 is a front view of the Flat showing the electric light column and arch over the roof garden through the arch No. 2 is a view from the rear, showing how advantage was taken of the steep hillside. The building to the extreme left in this photo is the garage the roof of which is utilized for a palm court or roof garden. A bridge connects the roof garden with the main court. The bungalows can be seen just beyond the garage. At the right in the distance is the flat building facing the street.

Looking from the roof garden toward the court



Bridge leading from the court to the roof garden, over the garage

Cement Production Increases in July

More cement was produced in the United States in July than in June, and more cement was shipped than was produced, according to figures prepared under the direction of Ernest F. Burchard, of the United States Geological Survey. Both production and shipments in July exceeded the average for July in the last five years.

The production for the first seven months of 1921 is more than 97 per cent of the quantity manufactured in the corresponding months of 1920 and more than 52 per cent of the total production in 1920; the shipments are more than 96 per cent of those for the corresponding period of 1920 and more than 52 per cent of those for the whole year 1920.

Stocks at the end of July were over 1,470,000 barrels larger than on December 31, 1920, and a little above the average for July in the five preceding years, though somewhat less than at the end of June.

The production of clinker (unground cement) during the seven months amounted to more than 53,000,000 barrels, and the July production exceeded 9,000,000 barrels. July stocks of clinker are reported as more than 4,300,000 barrels.

Production, Shipments, and Stocks of Finished Portland Cement in First Seven Months of 1921.

Month	Production (barrels)	Shipments (barrels)	Stocks at end of month (barrels)
January	4,098,000	2,539,000	10,300,000
February	4,379,000	3,331,000	11,400,000
March	6,763,000	6,221,000	12,000,000
April	8,651,000	7,919,000	12,600,000
May	9,281,000	9,488,000	12,450,000
June	9,296,000	10,577,000	11,150,000
July	9,568,000	10,301,000	10,414,000
	52,036,000	50,376,000	.....

These statistics are based mainly upon reports from producers of Portland cement and are subject to slight revision. It is hoped to issue monthly a similar bulletin on the industry.

New Building Material

A new patent recently taken out in Austria by Dr. Rudolph Ditmar of Graz for an inexpensive building material is described in the *Scientific American*. It is designed, we are told, to relieve the shortage of dwellings, which is felt there as well as here. The process is not strictly new, being based upon a system long employed by the Chinese and Japanese. We read:

"The inventor begins by placing two sheets of wire netting parallel to each other at a suitable distance and binding them together with wire. The receptacle thus formed is then filled with gravel sufficiently coarse not to pass through the mesh of the wire. The outer side of the netting is then covered with thick concrete which penetrates the meshes of the wire and unites with the gravel immediately in contact therewith, to form a layer in which the wire netting becames embedded. After these outer slabs of concrete have hardened the gravel in the middle can be poured out and the space which it occupied filled by asphalt, tar, paraffin, or any other desired filler. Such a substitution is especially useful for the construction of the walls of ships or buoys or other articles where lightness as well as strength is demanded. The inventor claims several advantages for this kind of building material, including cheapness, the saving of more valuable material, and the readiness with which the hollow concrete slabs can be shipped to places difficult of access, such as mountain resorts. Furthermore, houses thus built can readily be 'wrecked' without the use of explosives."

Quarries of Cement Companies

Reports received by the United States Bureau of Mines from all quarries that produced cement rock in 1920 show increased activity in this industry during the year. The number of men employed by cement-rock quarries was 13,251, an increase of 3,805, or 40 per cent, over the previous year. Each employee averaged 321 working days during the year, and the total number of shifts worked by all employees was 4,249,485, the former figure indicating that each workman averaged 34 more days of employment than in 1919, while the latter figure shows an increase of 1,538,114 days of labor, or 57 per cent over the year before. About 30 per cent of all employees worked in or about the quarry pits, the remaining 70 per cent being employed in crushing or grinding the rock and in the manufacture of cement.

Accidents during the year resulted in the death of 39 men and the injury of 2,585, showing that for each thousand men employed during a standard year of 300 working days, 2.75 deaths and 182.49 injuries occurred. The corresponding rates for 1919 were 2.66 killed and 231.58 injured. Of the total number of accidents, 21 fatalities and 875 injuries occurred in and about the quarry pits, and 18 fatalities and 1,710 injuries occurred at the outside plants. Nonfatal injuries to men working inside the quarries were due principally to the following causes: 135 to haulage accidents, 121 to falls or slides of rock or overburden, 91 flying objects, 78 machinery, 61 handling rock at face of quarry, 50 falling objects, 36 falls of persons, 35 timber or hand tools, 28 explosives, and 23 to drilling or channeling. Of the injuries at the outside plants or mills, 207 were caused by machinery, 194 by hand tools, 179 by falling objects, 178 by flying objects, 145 by burns, 132 by falls of persons, and 125 by haulage accidents.

Among the states having the largest number of accidents were Pennsylvania with 514, California 412, Missouri 260, Kansas 258, Texas 209, Illinois 137, New York 99, and Washington 29.

Specifications for Sand and Gravel

By E. Guy Sutton*

A few years ago a man engaged in the sand and gravel business felt that he must apologize for the fact. Today the products of his plant are considered basis material and as essential to the progress of the nation and the development of permanent wealth as are steel and cement. Especially is this true of sand, for no modern building project can be constructed without its use. As a result of the increased use of sand and gravel the industry has emerged from the shovel and wheelbarrow stage until now it represents

an investment of $150,000,000 with a potential output of 300,000,000 tons. With the development of the business has come a demand for refinement of product and as a consequence a great variety of specifications have sprung up covering the use of gravel, most of which have been adapted from those drawn years ago for crushed stone, an essentially different product.

In view of these circumstances it has been the purpose of our Association to develop specifications that are especially applicable to the use of sand and gravel. In giving consideration to this subject we have kept in mind three prime factors:

1. The finished work.
2. The natural variation as to sizes occurring in deposits.
3. Economy of production.

Aside from the fact that it should be the desire of every producer to turn out an honest product it is good business that the completed job in which his material is used should be of the very best quality. One poor piece of concrete road or a faulty column due to improperly prepared gravel will tend to discredit the use of gravel. Every producer, therefore, owes it to himself as well as to his fellow producer to keep his products of the highest standard in order that sand and gravel may hold their place along with other aggregates.

We all know that there is a great variation in the same and in different deposits as to the maximum and minimum as well as intermediate sizes. Until recently there was a growing tendency among engineers to make the deposits conform to their preconceived notions as to grading rather than to follow the logical course and draft specification to fit the most available material.

As a result of our agitation of the subject the American Society for Testing Materials has adopted as a tentative standard, a series of sizes which we suggested, any one of which is recommended as being suitable for concrete road work subject to such adjustment of sand, cement and water content as may be necessary to make a standard finished product. We have had the hearty co-operation of the Bureau of Public Roads in establishing this schedule of sizes and no doubt it will be adopted as a part of the typical specifications for gravel concrete roads which that Bureau at our solicitation is now drafting.

We are also in close touch with the National Research Council which have in course of preparation as standard specification for all forms of concrete work. This Council has unlimited financial resources at its command and is making a thorough theoretical and practical study of the subject.

Based on tests recently completed at Purdue University we also expect to secure a more liberal specification for tolerance—that is, the percentage of material above the maximum or below the minimum sizes; also, we hope to see less restrictions being imposed on the percentage of intermediate sizes.

The value to the producer of this greater liberality in specification will show itself in the reduced cost of production and furthermore in that a greater percentage of his material will be made acceptable for use in all kinds of construction work. It will place him in a better position to compete with other forms of aggregates. There is, of course, a limit beyond which he must not go in this respect, however, for if specifications are too open, too easy to meet, it invites the side of the road or temporary plant. Insistence upon a clean, screened and reasonable well-graded aggregate will largely overcome this possible objection.

In general, it will be the determined purpose of our association to see that gravel takes its rightful place along with other aggregates in every gravel producing territory.

Each producer is interested in this activity of the Association, for he cannot tell when the sentiment against gravel may invade his state if the unwarranted prejudice developed in some quarters is allowed to go unchallenged. Then, too, aside from the direct benefits to be derived by the development of proper specifications covering the use of our products we are getting a vast number of competent engineers of national reputation thinking and talking in terms of sand and gravel. This, in my opinion, is the most effective advertising medium we could command.

The outstanding accomplishment of the National Association for the year 1920, as I view it, may be expressed in one word: RECOGNITION. We have impressed the federal departments and regulatory bodies with the fact that there is a sand and gravel industry; we have obtained marked consideration from the legislative branches of our government; we have won the respect and support of allied industries: we have interested a greater number of producers with the effectiveness of our association work; we have increased our finances. We have gained Recognition both without and within our industry.

Thus, we have paved the way for prosecuting a more formidable and aggressive program for the ensuing year. Our formative period is past and we stand prepared to face the tasks of the future with strength and confidence.

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*Business Manager, National Association Sand & Gravel Producers, Washington, D. C.

Contractor Leads in Movement for Better Building

When you think of Palm Beach, you picture a group of palatial homes, resplendent in the warmth of a winter's sun. One of the men who has contributed much to the beauty of Florida's shore, is John B. Orr, Plastering Contractor, of Miami. Recognized as a leader in his art, he has built up an organization of experts unsurpassed in the application of high grade stucco.

Mr. Orr has not confined his efforts to the particular locality where so much of his prominent work has been done, for he has given national organizations like the American Concrete Institute the benefit of his intimate knowledge of all kinds of stucco materials and bases. As a member of the Institute Committee on Treatment of Concrete Surfaces, he has been fully alive to the necessity for careful design of the entire structure if good stucco results are to be obtained. The school of experience being his teacher, he knows that good stucco is possible only if his men are thoroughly familiar with the fundamentals. He has therefore developed a nucleus of experts, whom he employs the year round.

His men have a personal pride in the work they turn out, and consequently every completed project is of the highest class, the results of the very best efforts that the organization can put forth to make it so.

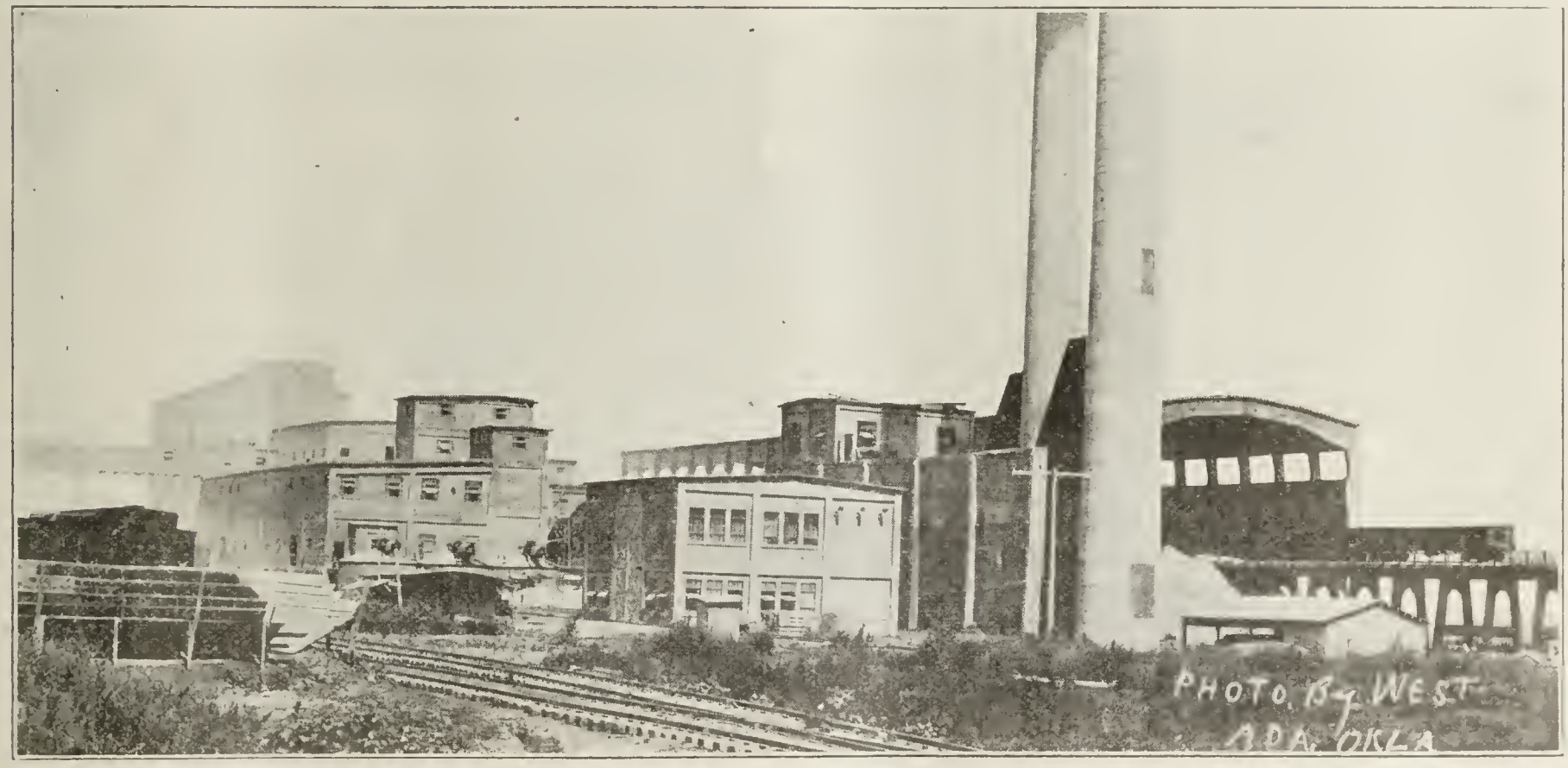
Speed and uniform standards have made Mr. Orr's accomplishments stand out. A noteworthy piece of work was his completion of the Ostend Apartments at Miami, a three-story building of stucco on ready for occupancy in thirty-five days. Few, if any, organizations could have duplicated this achievement.

New Wet Process Plant of the Oklahoma Portland Cement Co.

Turning mountains of shale and limestone into building material, is the work of the plant of the Oklahoma Portland Cement company at Ada, Oklahoma, one of the largest Portland cement plants in the world.

Covering an area of more than forty acres the plant represents an investment of more than $2,000,000. It has a total daily output of 5,000 barrels of cement, or fifty carloads. Its railway facilities alone surpass those of many of the smaller cities of the state, and its force of workmen—600 men—would alone form a small town.

The Oklahoma Portland Cement company operates two cement mills at Ada, one a dry process plant with a capacity of 2,500 barrels per day; the other a wet process plant with a capacity at present of 3,000 barrels per day. The dry process plant has been operating for about fifteen years, while the wet process plant was completed in January, 1920, and the description given below covers the operation of the later construction.



General view of Oklahoma Portland Cement Co.'s plant at Ada, Okla.

"O. K." which is the brand of cement manufactured at Ada is made of raw material consisting largely of limestone and shale. The deposits are located about six miles south of Ada at Lawrence, Okla., where the company operates a 2,000 ton per day crushing plant as well as a shale quarry with a production of 500 tons per day. The limestone and shale quarry are facing each other and are about three-fourths of a mile apart, and both offer practically an inexhaustible supply.

Sanderson Cyclone well drills are used for blast holing, cutting a 5⅝-in. hole. The company uses five drills, four of which are steam driven and one electric. Eventually, all of the drills will be electrically driven. The holes are drilled 14 feet back from the face and 14 feet apart, the average number of holes being 90. Two or three rows are shot at one time, the rows being staggered. The holes are charged with 50 per cent gelatine dynamite on the bottom and 40 per cent on top, the proportion being 1 to 4. All of the rows are shot at one time with a Cordeau-Bickford detonator.

The larger blasted stone goes through a second blasting to make it suitable for handling by steam shovel. This is done by means of Sullivan air drills and a light charge of ⅛ to ½-lb. of 40-per cent dynamite.

The rock is loaded into 12-ton electric driven side dump cars (operated from a central tower) by means of a 60-ton steam shovel, with a 2½-cu. yd. dipper or with an 80-ton shovel with a 3½-cu. yd. dipper.

The stone is then transported in these cars a distance of one-half to three-quarters of a mile to the crusher where they are electrically dumped into a crusher. The preliminary crusher breaks the stone to sizes of 8 inches and down. The material is then discharged from the jaw crusher onto a feeder, the feeder discharging into a large slow moving chain and bucket elevator which elevates the stone to a height of about 80 feet where it is discharged into a scalping screen. All of the stone which is less than 2½ inches drops through the screen and by-passes the finish crushers. The finish crushing is done by two gyratory crushers and a No. 9 Jumbo Williams hammer mill which reduces it to 2½ inches and under. The discharge from these crushers are re-elevated and dumped into the sizing screens which separate it into the three sizes required, which is commercially sold as ballast, commercial concrete stone and in the manufacture of cement.

After the stone and shale reach the cement plant at Ada they are placed by the Frisco switcher on the elevated raw material unloading track which extends through the entire length of the stone and shale storage building. The switch engine makes two trips daily transporting from 12 to 15 cars each trip.

The stone and shale storage building is 300 feet long by 80 feet wide by 70 feet high, built of reinforced concrete and consists of a 20-foot bay in the middle of

the building used as proportioning department, with adjoining storage for stone and shale on each end. The approximate capacity of each storage is about 18,000 tons, sufficient for a two-months' supply for operation of the plant for shale and a one-month's operation for stone. The material is taken from the cars both by dumping and with a 15-ton direct current electric overhead traveling crane provided with a 4 cubic yard clam shell bucket.

The material is fed from the mill bins by gravity into the preliminary compartment of wet compeb mills. At this point enough water is added to give the mixture being ground approximately 40 per cent moisture. The preliminary compartment of this mill is equipped with a special set of grid bars so that when the material reaches the proper fineness it passes from the preliminary to the finish compartment of the mill. The preliminary chamber of these mills carries a charge of 20,000 pounds of 5-inch balls and under, and the finish compartment a charge of 62,000 pounds of ⅞-inch to 1¼-inch balls, both charges being variable and based upon the hardness of the material. The mills travel about 20 revolutions per minute and the power required averages approximately 525 kilowatts. Each mill has a capacity of approximately 70 barrels per hour. The fineness in the finish compartment is about 96 on the 100 mesh sieve, which has 10,000 holes to the square inch.

This material when it is discharged from the Allis-Chalmers compeb mills is called slurry, and flows by gravity into the special hatch tanks where an analysis is made by the chemist. The batch tanks are three in number and hold approximately enough slurry to manufacture 300 barrels of cement. Adjacent to the batch tanks are located three control mix tanks, each of which has a capacity of 1,000 barrels, and it is in these tanks that the chemist is able to secure exactly the proper mix to manufacture a high grade cement. The top of the mix tank is just below the bottom of the batch tank, therefore the slurry flows by gravity to this point.

As soon as this material is O. K.'d by the chemist it is elevated a sufficient height so that it will flow by gravity into the two kiln feed tanks which have a capacity of 2,000 barrels each. From the kiln feed tanks it is elevated by bucket elevators and feed directly into kilns which are two cylindrical rotary kilns ten feet in diameter and 240 feet long. These kilns are lined with fire brick furnished by Davis Fire Brick Co., Oak Hill, Ohio, practically throughout their entire length.

Gas is used for fuel and the approximate heat attained in the burning zone is 2,700 degrees Fahrenheit. The raw material at this temperature is calcined and forms into a clinker.

As these kilns rotate continually and as the inttake end is considerably higher than the discharge end, as the material passes through the kiln it is discharged into a clinker pit from which it falls by gravity into a rotary cooler 8 feet in diameter by 70 feet in length. From this cooler it drops directly into the clinker pit from which it is elevated with a bucket elevator to the bridge between the mill building and clinker storage building and deposited into Perkins pivoted bucket carrier which in turn discharges it into the clinker storage bins, 25 feet in diameter and 85 feet high, each bin having a capacity of 10,000 barrels. A fineness of 82 per cent on a 200 mesh sieve, which has 40,000 holes to the square inch.

The entire new plant is electrically driven, and power is furnished to the company by the Oklahoma-Shawnee Power Co., Byng, Okla. It enters the company's substation at 33,000 volts through a set of four 1,000-k.w. 3-phase transformers. Two 100-k.w. motor generator sets furnish direct current for operating the overhead electric crane in the stone storage and for the excitation of the synchronous motors connected to the compeb mills.

A 10x2-cylinder low-pressure Sullivan air compressor furnishes the air for slurry agitation, while another single-cylinder air compressor furnishes the air for power purposes.

The power required for two units is in the neighborhood of 2,000 k. w. and it is estimated that 2,750 k.w. would be sufficient for operating three units.

PRICE REDUCTION

The Link-Belt Company announces a practically uniform reduction of 10 per cent on malleable iron and steel ("SS Class) Chains, Sprockets, Buckets, and other products, effective at once.

Westinghouse Underfeed Stoker

Just at the time when power plants are particularly interested in coal saving suggestions and are utilizing every available means for fuel economy, a knowledge of the efficiency of the Westinghouse Underfeed Stoker is timely. The economical advantage derived from an underfeed stoker is briefly this: Responsibility for the power plant is centralized as one man can attend to many stokers, plants required to carry high peak loads of certain periods of the day do not need to maintain extra boilers, and greatest of all—one quarter as much coal is required if the stokers are intelligently operated. The coal saving is a result of smokeless combustion due to heating the volatile substances in the coal before introducing them to the fuel bed, and to correct mixing of air with the coal.

The principle of design for the Westinghouse Underfeed Stoker although of the general type of inclined multiple-retort, has many distinguishing features. There are three divisions of the parts of the furnace, the fuel feeding, the fuel burning, and the refuse disposal, which are separately considered in the pamphlet recently issued by the Westinghouse Electric & Mfg. Co., E. Pittsburg, Pa.

Pumps-Hoists

The Sullivan Machinery Company, 418 Gas Bldg., Chicago, is producing a line of dry vacuum pumps in both single cylinder and duplex type and the single cylinder pump is described in Bulletin 78-A just issued. These pumps, it is stated, are equipped with the Sullivan improved wafer type plate valve for both intake and discharge openings; moreover, the machines are built in both steam and belt driven types with all moving parts enclosed, and they are fully lubricated by the splash method. The Sullivan "Turbinair" hoist is another new product of this company which is just being put on the market. It is described in Bulletin 76. These hoists find a wide range of use in mining coal and ores and also in many kinds of industrial work. Both bulletins are finely printed and appropriately illustrated.

Concrete Houses Have Increased Selling Value

Houses at Niagara Falls Sell Readily Though Higher Priced than Houses Less Durably Constructed

It is a decidedly human train to consider only first cost when making any considerable expenditure. Foresight of no mean degree is needed to look not only at the present, as exemplified in the first cost, but to see far enough into the future to weigh the final cost.

Concrete houses have always had to contend with the handicap of slightly higher first cost when in competition with some other types of less durable construction. It is often difficult for the prospective home owner to visualize the many years of useful service which concrete gives, the safety from fire and the lack of necessity for painting and repairs.

In the last few years great progress has been made in methods of constructing concrete and stucco houses so that in a great measure the difference in initial cost is being reduced, while the final cost, considering the low upkeep, low insurance premiums and small depreciation, reduces the ultimate cost of concrete to the lowest possible figure. Due to the campaigns being conducted by fire insurance bodies and housing commissions, the home owners are becoming more and more educated to the value of safe and permanent construction so that mere cheapness is no longer the governing factor.

An interesting example of the manner in which home owners are now weighing values rather than price is shown in a group of concrete houses recently erected by the Niagara Falls Double Wall Company, Niagara Falls, N. Y. These houses are of double wall construction, in which a complete and continuous air space is provided.

The houses cost to build about the same as frame houses in the vicinity. As similar frame houses were selling at from $10,000 to $11,000, the concrete houses were about to be put on the market for $10,500. But the houses looked so good, and, in fact, showed their greater value so plainly, that it was decided to price them at their real value.

As the saving in upkeep and fuel would equal the interest on $2,000 each year, the selling price of the houses was placed at $12,500. One of the principal selling points was the saving in upkeep and in fuel—with their added advantages of being more substantial and attractive in appearance. No difficulty was experienced in selling the houses at $12,500, in direct competition with houses of the less durable construction selling at $10,000.

Stucco Makes Attractive Finish for Concrete Block

By Gale M. Brooks.

Since the coming on the market of concrete building tile recently the use of stucco over concrete block has been given more attention than previously. These tile are finished with a rough surface usually scored, especially to receive a stucco finish.

One of the greatest difficulties which the cement block has to contend with is the matter of a satisfactory finish; another is the disadvantage for small residence construction especially of having to locate window and door openings just so the block spacing will come out right.

With a small concrete building tile, this last item is not a serious one and the beauty about a stucco finish coat is that even with larger size block, block may be cut right on the job to fit into any desired spacing, between window or door openings, making it not necessary to place these openings just so many block or half block widths apart.

The rough joint that may result from cutting block in the field is taken care of by covering with stucco. This makes the entire matter of laying up the block a much simpler one, since no time need be lost in careful fitting into place to meet exact dimensions.

A difficulty that is always experienced in using concrete block is the matter of breakage. Both in handling at the plant of the green product and in transporting and handling on the job, the sharp corners which are so vitally necessary to the first-class appearance of the ordinary concrete job are apt to be broken off by careless handling.

A real advantage of the stucco finish is that block do not need to be discarded even though their corners may be chipped off when the building is to be finished with stucco. The block can be handled more rapidly and there is no loss from culls.

For formal and imposing effects, the ordinary size of concrete block units made with an attractive face is in excellent keeping.

For any work where cut stone would be considered, cast stone will take its place equally well, if not better. For the ordinary home of today, however, there is a desire to get away from the cold, somber effects of stone work and in much the same degree from concrete block.

In all the country from one end to the other there is probably no home that is nearly so popular as the stucco home. The stucco surface is capable of wide variations of finish, both as to texture and to color and there is a comfortable homelikeness about it that makes it especially attractive to the home owner.

Portland cement stucco, when rightly put on, is absolutely permanent and there is absolutely no better backing upon which to apply stucco than a good wall of concrete block or tile. The stucco finish and the block being made of the same materials and (since the best results in stucco are obtained with 1 part of cement to 3 parts of sand) approximately the same mixtures, they shrink and expand equally with temperature and moisture changes.

A concrete block or tile wall is rigid, which is of first importance. The ordinary concrete block and tile affords a first-class bond for the stucco work. The units to receive stucco can be turned out at considerably less expense than units which most form the face themselves. Coarse aggregate can be used in the mixture, which substantially reduces the cost of materials, and no care need be taken to obtain a smooth finish—a somewhat rough finish in fact being preferable—and no particular pains need be taken with regard to maintaining the sharp corners or executing difficult facings on the block.

A concrete block or tile wall can be laid up with rapidity and any slight errors or inequalities can be taken up with the brown coat of portland cement. The block should be laid in portland cement mortar and the joints left open and unpointed to provide additional bond for the stucco. Over the brown coat, a dash coat of white portland cement or any one of the many very attractive finishes which can be obtained with white cement, either alone or in combination with color marble or granite chips, can be applied.

This work is done rapidly and the cost of application and the materials will be little if any more than the cost of facing the block would be. The general saving in labor and freedom from loss due to breakage and in pains required for the work will be found to be substantial.

In addition we have what the home owner of today regards as the most attractive finish to be found, applied on a wall which is fireproof and absolutely permanent construction. What more could be asked?

Reground Waterproof Portland Cement

The Advance Waterproof Cement Co., 175 W. Jackson Blvd., Chicago, Ill., have issued a 10-page booklet concerning their product, which they will gladly send to any of our readers. The first page of the booklet contains the following information:

"Reground Waterproof Portland Cement is true and genuine tested Portland Cement reground to the fineness of talcum powder, thereby obtaining more collodial efficiency, waterproofing value, or cement glue that is produced by the standard specifications for fineness of Portland Cement. It is equally as strong, efficient, and fire resistive as any standard brand of Portland Cement, but in addition it renders Portland Cement concrete, plaster, stucco and mortar in which it is used non-absorbing and impenetrable by water or moisture.

"Our cement being a high grade Portland basis it is collodial, soluble and therefore of the very highest cementive energy, absolutely waterproof and hard setting, and after it has set it has no affinity for water but repels water and moisture, due to absolute density obtained in the finished product of either concrete, plaster, stucco or mortar.

"Our Reground Waterproof Portland Cement is produced by our patented scientific process of regrinding true and genuine tested Portland Cement by means of massive special machinery designed for the purpose, thereby yielding up for cementitious and gripping purposes the full 100 per cent of the colloids that pure Portland Cement contains.

Density

"The fineness and cementative value of our Reground Waterproof Portland Cement, creating absolute density which is the most practical and permanent method of waterproofing under all conditions and is obtained when our Reground Portland Cement is used in the composition. The fineness of our Reground Portland Cement not only completely densifies, but at the same time materially increases the tensile and compressive strength of the composition in its completed state.

Uses

"Reground Waterproof Portland Cement is especially adapted for every kind of perfect waterproofing of Portland Cement concrete, plaster, stucco and mortar used in all kinds of building construction, bridges, swimming tanks, storage tanks, silos, cement products, concrete ships and barges; plaster or stucco coating for walls, pits, etc., and in all cases where reliable and permanent waterproofing is wanted."

Common Sense Wall Construction

Thompson Form & Clamp Co., Box 166, Fond du Lac, Wis., has issued a catalog describing its system of "Common Sense Wall Construction." For this type of construction, light portable forms are furnished which, when filled with concrete, form a small section of either an 8, 10 or 12-inch hollow wall. After one section has been poured and tamped the form is moved along the wall and the process is repeated. One man can set and draw these forms without assistance. The forms build the wall in continuous layers 9⅜ inches high and 4 feet long at each filling. The machine can be released and removed as soon as the concrete has been tamped. The walls are thoroughly bound together by wall ties. Further information may be obtained from the manufacturer.

New President and Officers of the W. A. Jones Foundry & Machine Co.

A meeting was held on July the 29th at the Chicago offices of this company, to elect a new president to succeed Mr. Wm. A. Jones, who died recently. Mr. T. A. Jones was appointed, and the following officers were also elected: W. G. Jones, Vice President and Treasurer; J. A. Sizer, Secretary; G. W. Page, Assistant Secretary.

The general policy of the company is in no way altered by these changes, and Mr. W. G. Jones continues as general manager, in addition to holding his new positions as vice president and treasurer.

Mr. T. A. Jones, the new president, has been associated with the company for many years as its secretary and treasurer, and is largely responsible for its firm position in the business world at the present day.

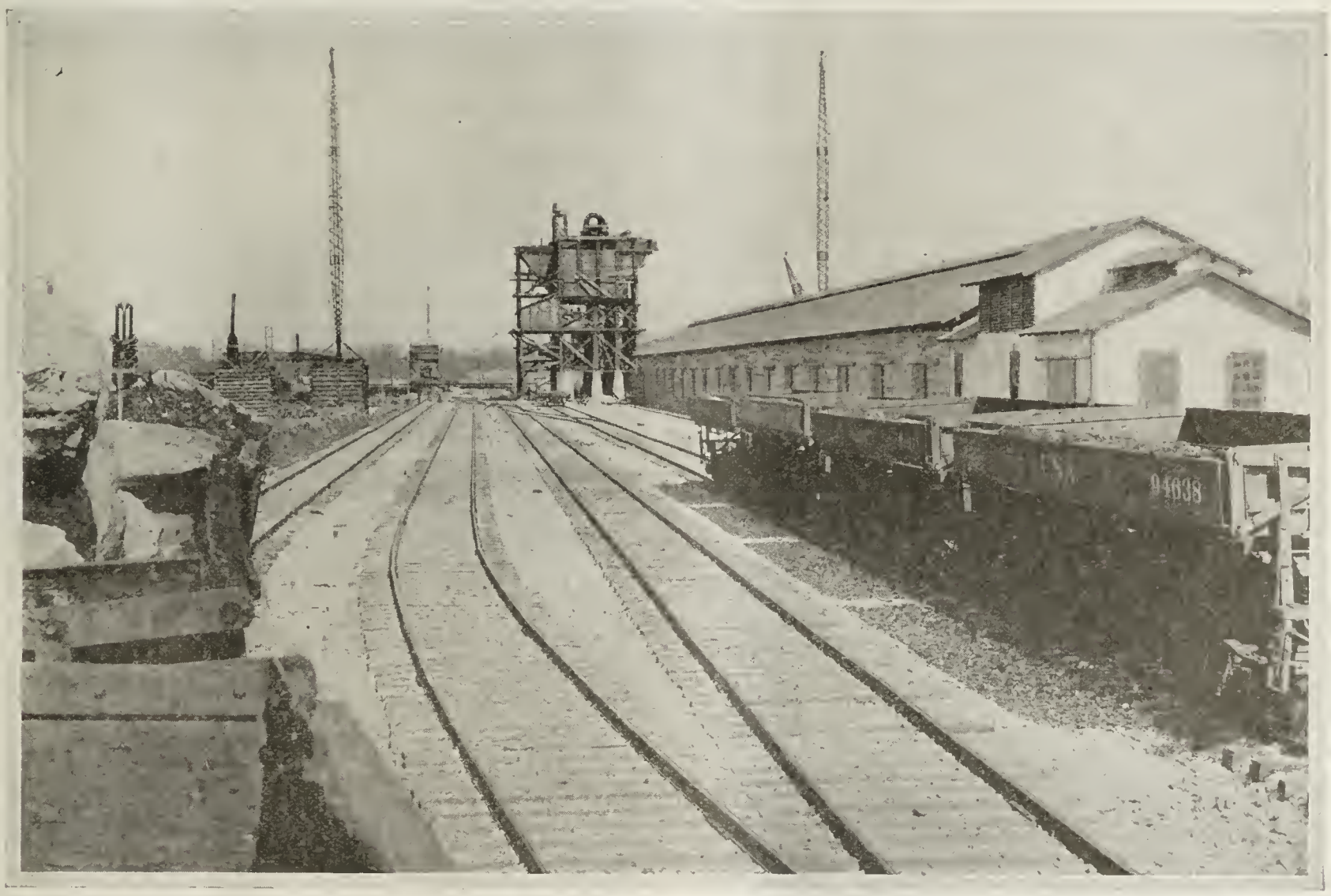
Wilson Dam and Muscle Shoals

However history may regard Woodrow Wilson, an enduring monument to his memory is being erected two miles below Florence, Alabama, to be known officially as Wilson Dam—the largest power dam in the world. Unless Congress holds up the work permanently, the waters of the Tennessee River will roar over the huge concrete structure eventually, and by the same token, the name of Woodrow Wilson, affixed to the structure, will go thundering down the ages. This great work is being accomplished by the efficient engineers of the United States War Department.

In one sense, Wilson Dam seems to be a by-product of the World War. In June, 1916, Congress passed a national defense act, appropriating millions for the construction of a nitrate plant and all appurtenances, at Muscle Shoals, Alabama. Wilson Dam is one of the appurtenances. Electricity is to be an important factor in this $40,000,000 nitrate plant, the largest such plant in the world. That is where the dam comes into the story. There will be a primary power development of 100,000 horsepower and a secondary development of 450,000 horsepower. The dam is being built 5,000 feet long, 4,100 feet from water's edge to water's edge; 96 feet high; 150 feet through the base, and wide enough on top to carry the Washington Highway across the river. The structure will require the placing of 1,250,000 yards of concrete.

Muscle Shoals is a famous rapids in Tennessee river, an ideal location for a power dam. The river bed rises about 100 feet in 18 miles above the dam site and now carries a roaring torrent of power wasted. The point selected for the dam is about two miles below Florence, opposite Jackson island. The structure ties into rock at both ends, the toe being 30 feet below the surface.

The construction of this dam, which the engineers of the War Department have undertaken, is a big work. Most of the work so far has been preliminary. A series of coffer dams was necessary. At the close of 1920, coffer dam No. 1, involving 17,500 cubic yards of rock excavation, was complete and Nos. 2, 3 and 4 nearly so. Nos. 5, 6 and 7 still had 200,000 cubic yards to come out. A great four-track construction railroad bridge had been built across the river, along the proposed apron of the dam. Since the first permanent concrete was poured, May 6, 1920, concrete has been placeed on the north side to a depth of 20 feet, which brings it above low water. During the winter this part of the work was suspended, the department to continue the work after high water in the spring. As the year closed the extensive powerhouse site on the south side was being graded, and a canal around the dam on the north side was being excavated.



View from lower end of Jackson Island, looking up-stream, with cement house, mixing plant and supply Derricks in foreground and supply derrick in background. The Western Air Dump Cars, on the right, are used for hauling concrete aggregates.

The construction of this canal, 60 feet wide at the bottom, is considerable of a job in itself. There will be two locks, with a lift of 75 feet for carrying the river traffic around the shoals and dam, and on to the Ohio river. As a part of the preliminary construction 800,000 cubic yards of earth was taken from this canal and dumped into the river on the north side of the stream, the material being handled in 20-yard air dump cars. In this way a strip of made-land, 250 feet wide, was secured, and on this strip were erected machine shops, blacksmith shops and other necessary buildings, and railroad tracks and switches, leading

View at Florence Dock, showing method of unloading sand and gravel into Western Air Dump Cars

to the big construction bridge and other parts of the work, were laid.

An enormous crushing and mixing plant was erected on Jackson island in midstream, supplemented by two smaller plants on the north and south sides of the river. The smaller plants have a daily capacity of 2,200 cubic yards. In one, two 2-yard Jaeger mixers and in the other, two 2-yard Boss mixers were installed. The larger plant on Jackson island has a

General view of Coffer Dam No. 6 as it appeared Sept. 1, 1920, showing cut off wall and excavation of rock commenced.

capacity of 4,000 cubic yards in a 24-hour day and is equipped with two 4-yard Austin mixers. A brief description of the Jackson island plant will enable readers to visualize the entire operation.

In making the concrete a mixture of 5 sacks of cement, 11 cubic feet of sand and 24 cubic feet of crushed stone is used. To obtain stone for the crusher and "plums" for the monolithic construction, a quarry has been opened a short distance up the river, where an unlimited quantity of rock can be obtained. Rock for the crusher is loaded into Western 20-yard air dump cars and dumped directly into the huge crusher-bin at the plant. At the bottom of the bin a powerful 48-inch Allis-Chalmers gyratory crusher breaks the rock into pieces which six 14-inch crushers can handle.

Sand is taken from the riverbed at Buck island, seven miles away, by means of sucker and floating dredges. It is carried to the Florence docks by a fleet of 16 scows, where it is unloaded into bins. Western dump cars carry it from there to storage piles at the Jackson island plant.

A cement shed adjoins the mixer and holds 140,000 sacks of cement. The sacks are emptied by hand onto a conveying belt, in proper proportions, and conveyed to the Jaeger mixer. At the same time proportioned agrregates are fed to the mixer at the rate of 2,000 cubic yards a day. After mixing, the concrete is discharged into 4-yard buckets, handled on flat cars. When the train of concrete arrives at the desired point on the construction bridge, the buckets are lifted by crane and their contents discharged into the forms. The dam is being poured in three lifts.

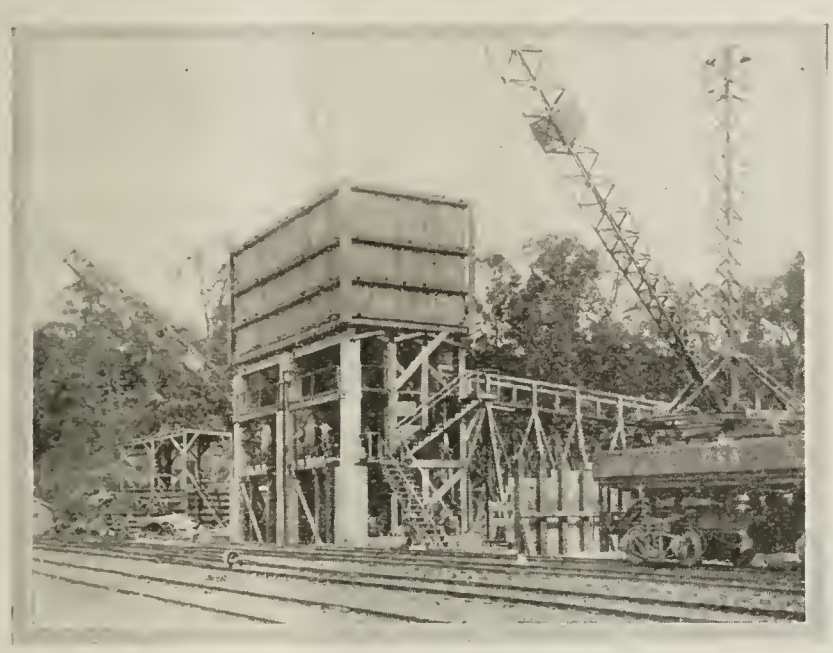
Specially constructed and electrically operated travelling cranes, with 100 and 115 foot booms, move back and forth on the construction bridge, handling the buckets of concrete and the huges cubes of stone, "plums," which are dropped into the plastic mass in the construction of this monolithic concrete structure.

In connection with the cement house there is a cement shaker, manufactured by the Handy Sack Baler Co., 620 South Second St., Cedar Rapids, Iowa, for salvaging the cement dust retained by the emptied bags. The apparatus holds 1,000 bags and the operation results in the recovering of about 11 bags of cement from that number—entirely worth while, as the salvage amounts to twice the cost of the labor of handling and baling; in addition to which there is an allowance by the manufacturers of 25 cents for every sack saved.

Work of such magnitude requires an enormous amount of equipment. The great utility of the side-dump car in construction, as well as in excavation, was never beetter demonstrated. The Government is employing 55 Western air dump cars of 20 cubic yards capacity, on the work, and they are used for carrying a great variety of materials—dirt, stone, sand etc. In addition to these there are 15 hand-operated side-

dump cars of 12 yards capacity. These are used for hauling coal and other material. In the preliminary work 50 Western 1½-yard side-dump cars and a number of convertible gondolas were used in connection with seven 5-horsepower gasoline locomotives. This narrow-gauge equipment was intended originally for war service in France, and the locomotives were heavily armored when they arrived at the damsite.

The steamshovel equipment consists of 3 Type B's; 2 No. 31, with crawling traction; 1 No. 70; 1 No. 92, and a No. 70. Twelve 25-ton and eight 40-ton saddle-tank locomotives; and five 62-ton Mogul locomotives, the latter originally built in 1907 for service in Panama, haul the trains. There are some 16 locomotive cranes, ranging in capacity from a 5-ton to a 50-ton, and 10-ton and 20-ton guy derricks. Seventy-five box cars, handle lumber, cement, etc.



Close up view of concrete mixing plant on South Side

Several thousand men are employed. They work in three shifts, two of eight hours each, and one, of six hours. The camps for their accommodation, built on both sides of the river by the Government, have reached the size and dignity of villages, with running water, sewer, hospitals, schools, churches, business house, places of entertainment, etc. The administrative offices are on the north side, about two miles from Florence.

Wilson Dam, when completed, will form a lake of impounded water, 14 miles long. For four miles above the dam this lake will be a mile wide and about a hundred feet deep. The backing-up of this immense body of water will eliminate the shoals up to a point where eventually a smaller dam is to be constructed, adding to the power development and making navigation possible from Chattanooga to the Gulf. Primarily, however, Wilson Dam is designed to furnish electrity for the biggest air-nitrate plant in the world, which will manufacture explosives in time of war and fertilizer in time of peace. The pretty little city of Florence expects to be a great hydro-electric power center. There are also other visions. Congress willing, Florence hopes to see drydocks built in a natural basin, seemingly made for the purpose, near the north end of the dam.

Cement Saved By Mechanical Tamping

The Paving Specifications of Lucas County, State of Ohio, show the difference betwen hand tamped cement and machine tamped cement. A saving of ¼ of a barrel of cement to each yard of concrete is allowed by Lucas County, Ohio if machine tamping is used instead of hand. The following two paragraphs are taken from their book of Specifications:

"The proportions used, unless otherwise shown on the detail plans, shall be volume approximately one (1) part of cement, one and one-half (1½) parts of sand, and three (3) parts stone. Concrete of the above mentioned proportions shall in no case contain less than 1.85 barrels of cement to the cubic yard.

"When machine finishing concrete is employed these proportions may be changed to approximately 1-2-3½, and in this case a cubic yard of concrete shall contain not less than 1.6 barrel of cement."

That mechanical tamping is reaching a perfection is very evident from observations in Lucas County of a motor truck delivering concrete after a haul of four miles from a central mixing plant. It was necessary to use a pick to clean out the truck, yet this Austin double tamping bar eccentric drive machine hammered the concrete into a solid road with a perfect finish.

Road Machinery

Catalog F of the Austin Manufacturing Company, Chicago, is devoted to picturing and describing the several types of Austin road rollers operated by either kerosene or steam motors. Road scarifiers also come in for consideration and illustration. Many of the pictures display the Austin machines at work on different kinds of roads and streets, while other cuts show them as they appear ready for use. Complete descriptions of the salient features of this road machinery are accompanied by pictures of different parts for the information of the reader. The cover of the catalog is done in colors and is very handsome.

Dragline Cableway Excavators

Sauerman Bros., 1139 Monadnock building, Chicago, has issued an attractive pamphlet on Sauerman dragline cableway excavators. Numerous illustrations show these excavators at work and speak eloquently of the adaptability and efficiency of this equipment. The text is unusually well written and a careful reading of this pamphlet will well repay anyone interested in the handling of sand and gravel. It is generally conceded that dragline cableway excavators meet a wide rane of conditions. They are suited to digging either loose or hard packed material, operate with equal efficiency whether gravel is in a dry pit or partly under water as in taking gravel from the bottom of a stream or pond. Further information may be obtained from the company who will send pamphlet upon request.

A Portable Belt Conveyor Speeded Up Our Work

By F. E. Hanselman, Contractor

The use of a belt conveyor was a great help to us in speeding up the construction of the new power plant of the Cleveland Electric Illuminating Company at Cleveland, Ohio. This was a new power house to be constructed adjacent to the present plant of this company.

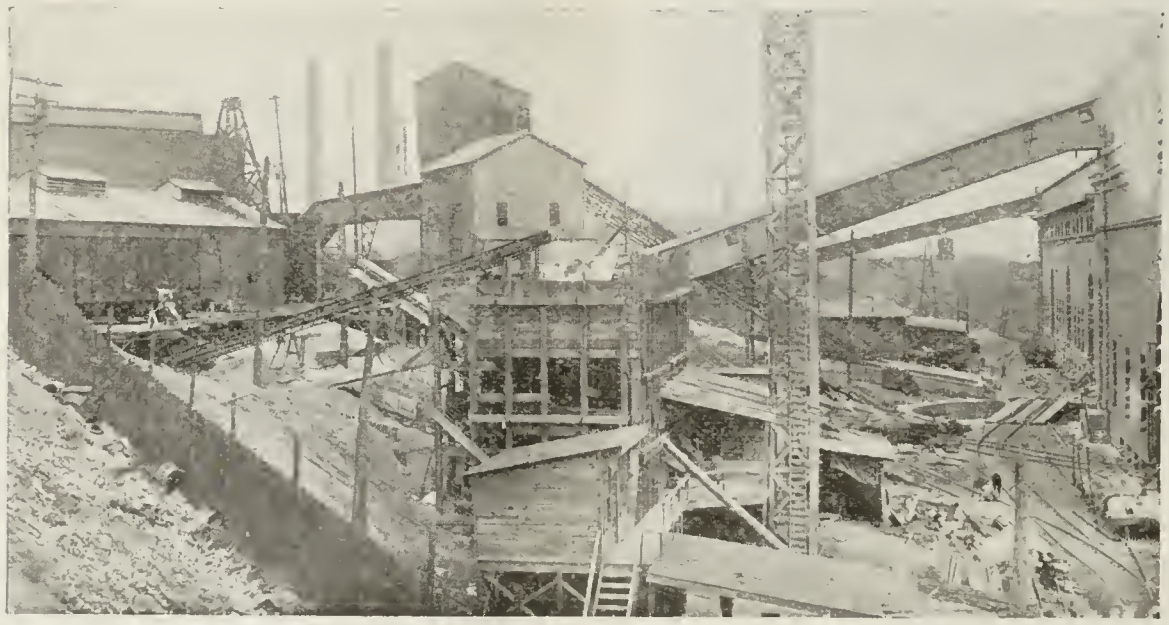
Ten thousand yards of concrete were required for the work, and due to rather congested quarters, the economical handling of the sand and gravel looked like something of a problem. We arranged, however, to install a portable belt conveyor 60 ft. long which carried the aggregate up into storage bins above the mixer, direct from a pit into which it was dumped from an overhead discharge. The layout is shown by the accompanying photograph.

During that part of the season while Lake Erie was closed to navigation, sand and gravel had to be brought in trucks. At other times it came in bottom dump cars as shown in the illustration. In both cases, the material was dumped direct into the pit and the conveyor was able to handle the materials as fast as they came. The aggregate which was trucked in was carried by a fleet of motor trucks with a capacity of six or seven tons each. At no time were they able to swamp the conveyor. An average of 22 yds. of concrete was mixed and poured per hour. Often the material would be emptied out of the hopper by the conveyor before the truck which dumped the load could get away from the hopper. Thus, no delay was encountered except the wait for a truck to back onto the hopper after the one ahead had moved away.

At the upper end of the conveyor a butterfly arrangement was rigged. This consisted of a tilting platform which deflected the stream of material so that the conveyor could discharge either sand or gravel into the proper bin.

The storage bin had a capacity of three carloads of sand in one compartment and five carloads of stone in the other, which gave ample storage capacity. While the sand and gravel came in the railroad cars, high speed was shown in the delivering of material. The fastest time was made with a car of rock when 52 tons were unloaded in 29 minutes by one man. This included the time it took to move the car along to facilitate dumping, which meant that the worker put in twenty minutes of actual work in the car.

The speed and saving over hand methods can be appreciated when it is considered that to unload and wheel that same amount to the large bin by the old time method, would have taken six good shovelers and three good wheelers a whole day..



Concrete and material plant layout, showing conveyor, storage bins, mixer and concreting tower. Note diverting platform at discharge end of conveyor, the conveyor was made by the Portable Machinery Co., Passaic, N. J.

The Cardinal Points of Good Stucco Design

The cardinal points of good stucco design as indicated below are frequently overlooked and neglected by many designers. On many occasions we see magazine illustrations and even detailed drawings which ignore these points, writes the Associated Metal Lath Manufacturers.

We are therefore enclosing two copies—one of which we would suggest you retain and consult whenever illustrations or details of stucco houses are presented to you for publication.

A stucco house is extremely economical and very popular, but unfortunately the cardinal points of good stucco design are too frequently neglected, and the owner does not get the value he is entitled to.

(1) Stucco should not be run down to the ground without a solid impervious base course.

(2) The proper overhang and drip should be provided for all window sills and other horizontal woodwork, and some stop should be provided at the ends to avoid the concentration of water over end of the sill.

(3) The design should be chosen to permit of a generous overhang of eaves and cornices.

(4) There should be no horizontal surfaces of stucco on which water can collect. Liberal and discriminating use of flashings should be made wherever water might get behind stucco—such as at roof and wall intersections, under joints of masonry trim, etc.

(5) Chimneys should be covered with impervious caps to avoid unprotected stucco at top of chimney. Chimneys should be wrapped with metal lath before stuccoing. Sheathing should be eliminated and metal lath back-plastered according to the findings of the U. S. Bureau of Standards.

A Big Job Successfully Completed

Construction of the Albert Lea Concrete Water Tower and Reservoir Presented Some Difficult Problems, Which Were Successfully Overcome.

By E. R. TARNOSKI
McManus & Tarnoski, Contractors & Engineers, St. Paul, Minn.

The successful completion of this big job was an undertaking which required considerable time and engineering skill and it was only after these two things had been dealt with that this concrete water tower and reservoir were finished. It is situated in the town of Albert Lea, Minnesota. We are very glad to tell the readers of the CEMENT AND ENGINEERING NEWS of the construction of this remarkable tower and some of the problems which it presented.

At the time of letting of this contract considerable skepticism was evidenced by the town people as well as by some members of the council as to the advisability of the construction of a water tank wherein reinforced concrete was to be used as a medium to impound water under pressure. On account of these doubts the council passed a resolution deciding to postpone the date of the letting for another thirty days so as to be able in the meantime to gather information from other sources where tanks for water supply service of this character were in use. It is needless to state here that on the date of the second letting all doubts as to the use of concrete for the construction of the tank were eliminated by the encouraging reports received from these sources.

The pressure tank and reservoir are constructed in what may be termed the central part of Albert Lea and within one hundred feet of an artificial lake known as Fountain Lake. This enables equal distribution of even pressure all over the city.

The location of the site for this structure is on the side of a hill. This made the excavation rather difficult as one side of the hole to be excavated would be about thirty feet deep while the other side only five feet. On account of this slope there was some doubt as to the advisability of construction, since it was believed that a slippage towards the lake would occur. However, instructions were given to proceed with the excavation with a view to decide whether or not piles would be required. After the excavation was completed a thorough test was made and it was decided that the soil stratas were in such a position that piling would not be required for slipping as well as for soil preesure.

The bottom plate or foundation of the structure is one hundred feet in diameter, with the exception of the central forty-five feet, which is eighteen inches thick; the remaining portion of the plate being one foot thick.

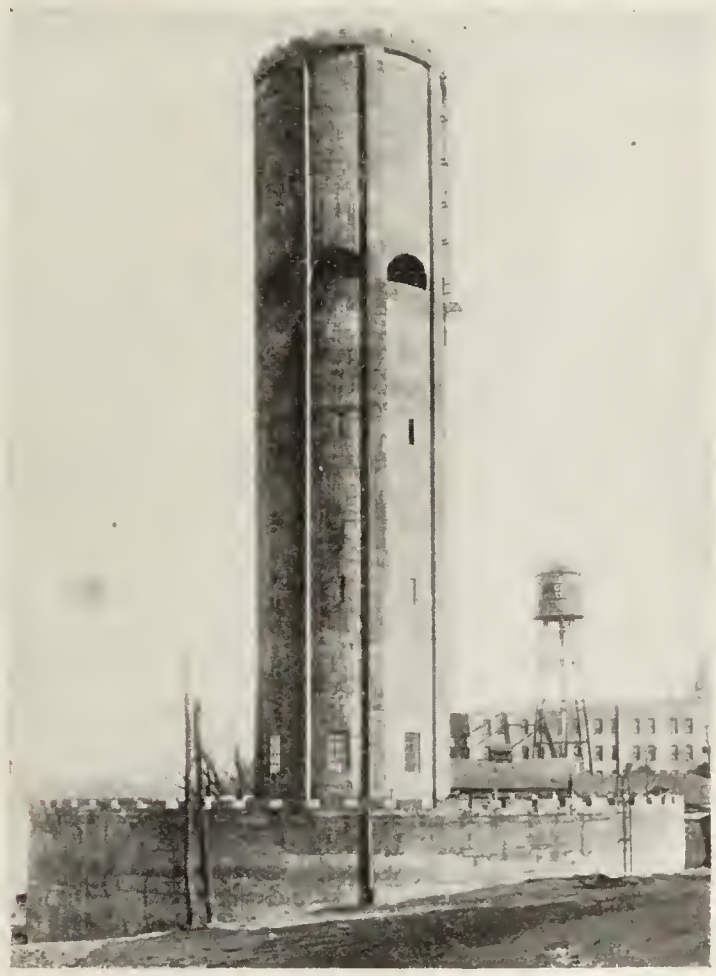
A considerable amount of reenforcing steel was used for this lower plate. Seven-eighths inch rods were used in the top and bottom of the plate running radially as well as circumferentially over the entire area. About sixteen tons of steel were used for this footing plate. Before the concrete for the plate was set, dowels were placed on a circle of thirty-foot diameter at eight points to provide for connection of columns which were to be used as supports for the pressure tank.

After the foundation plate was finished, it was decided that the tower should proceed in construction first, due to advantages gained for constructing the same. Slip forms were used in erecting this structure.

There are curtain walls between the eight columns which serve as a shelter for valves and other instruments required as well as a stairway which is used as a means to reach balcony floor level below pressure tank. The tower supports, as well as curtain walls, were run solid up to a point about thirty-two feet above the foundation of the plate. At this point slots were made in the concrete between columns so as to receeive the roof slab of the reservoir.

These slots were left in the wall so as to provide for continuous reinforcement for the roof of the reservoir and working floor, which were constructed at this point. From this point on, concrete was run and provision at three levels was made for windows and doors. In all, there are twenty-three windows and one door used in the structure.

At a level of one hundred and ten feet above the foundation plate a balcony floor was constructed. Four



feet above this floor a curtain wall between columns was left open so as to provide a balustrade around the balcony floor and from this point on, this opening was made in the form of an arch up to the bottom of the pressure tank floor. This point is about one hundred and twenty feet above the foundation plate and forms the bottom of the pressure tank, while the roof of the pressure tank is one hundred fifty feet above the foundation level.

The pressure tank is thirty feet high and thirty feet inside diameter and it is covered wih a reinforced roof. Battlements are placed above the roof level to relieve the monotony of the structure and thus improve the appearance.

The reservoir below is one hundred feet in diameter and the outside walls are thirty feet high. There is

a roof over this part of the structure which rests on the wall of the tower and outside walls of the reservoir, and between these two points there are a series of eight columns which in turn are connected with heavy concrete beams. There are also battlements above the roof level of the reservoir.

The capacity of the pressure tank is one hundred and twenty-five thousand gallons and the floor is twenty-four inches thick, while the walls are nine inches thick. The columns that support the pressure tank are fifteen inches by thirty-six inches and the curtain walls are six inches thick. The roof of the pressure tank is seven inches thick.

The capacity of the reservoir is one and one-half million gallons and the outside walls are twelve inches thick and the roof eight inches thick. Concrete used for reservoir and reservoir plate as well as the pressure tank is in proportion of 1:2:3. The concrete for the remaining portion of the structure has a proportion of 1:2:4. There were about one hundred and fourteen tons of reinforcing steel used in this reservoir and tank and about twenty-five hundred barrels of cement.

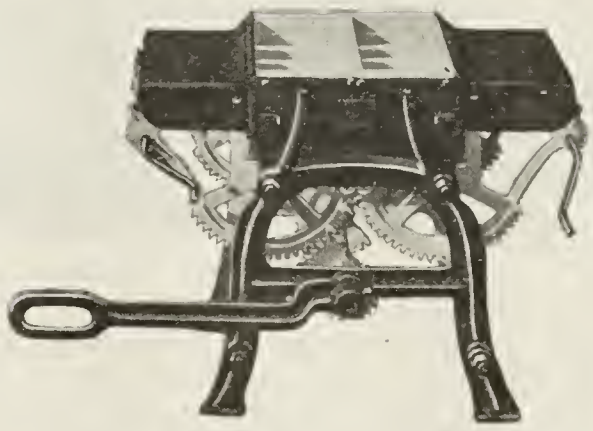
Mr. J. H. A. Brahtz of St. Paul, Minnesota, was the consulting engineer and designer of this tank and reservoir.

Profits in Cement Brick Making

They are Superior to Clay Brick and Can Be Sold at Lower Prices.

There are many reasons why cement brick are fast coming into their own as factors in the building industry. Not only can they be profitably manufactured and sold at a price even lower than the common clay brick, but they are superior in quality. They have greater compression strength, are more water proof, and through the use of richer facing materials offer the architect and builder a greater variety of artistic surface treatment.

As backing or filler brick they have double the compression strength of the common clay brick, and realizing that concrete brick are a better article and better



The Double Speed Brick Machine

value, builders and architects are specifying concrete brick for this purpose wherever they can be obtained. They have seen the common clay variety crack, spall and disintegrate, whereas, concrete brick improve and grow stronger with age.

Sand and cement are easily obtained at very low prices in nearly every locality, so that the manufacturer of concrete brick has a further advantage in quoting delivered prices, especially where clay brick have to be shipped in at considerable expense and loss on account of breakage.

Wood Bros. Thresher Co., Des Moines, Iowa, have succeeded as a result of expert investigation and tests, perfected a machine that has been found to meet the requirement of perfect cement brick making. The "Double-Speed" machine which is shown herewith makes sixteen bricks at each opeartion, eight bricks being delivered at each side of the machine. This machine equipped with a power tamper has a capacity up to 15,000 brick per day or 1,500 blocks per day. Roller-cut-off removes surplus material from mold box and finishes the top of the product. The brick are tamped rapidly and vigorously, resulting in a dense, strong product. Machine consumes little power and is practically fool-proof.

Bricks are made on this machine by the tamped process, not pressed. This is considered the correct way of making products of this kind as it eliminates all voids and drives out the air pockets, making a solid and stronger brick.

Experienced help is not required. The machine is so simple and easy to operate that anyone can make good brick with but very little practice. There is only one lever to operate. Every wearing part of the machine has been case-hardened, so that it can be used steadily, day after day, with no delays for adjustments and repairs.

The Double-Speed brick machine is a one-man outfit, simple in design, durable in construction, swift and economical in operation. It is a complete brick plant in itself, needing no accessories or other equipment, unless possibly a mixer. It makes brick all exact in size and proportion and having sharp corners.

Stucco Material in Various Shades of Green

The Rock Products Company Easton, Pa., recently built a plant, where they are manufacturing Roofing Granules made from an unfading Augite rock found in that locality. This rock is a magnesium aluminum silicate of a very hard nature. The plant is so constructed that while making this roofing the larger aggregates are separated out for Stucco and Terrazzo in standard sizes No. 1, No. 1½ and No. 2.

The Rock Products Company have also just completed a plant at their Serpentine quarry where they have one of the largest deposits of beautiful green Serpentine found in this country. This plant is designed so as to produce the various standard sizes of Granito and Terrazzo as well as the Stucco size in various shades of green consisting of Yellow-Green, Light-Green, Ever-Green, Royal-Green and their so-called Irish-Green which is practically translucent in color and of a semi-precious nature.

This company is also operating a large grinding plant in the city of Phillipsburg, operated by electric and water power from the Morris Canal, where various grades of magnesium silicate are produced, some of which are very white in color and used as fillers for paint, paper, etc. They are also producing what was known for years as the "Warne China Clay" and various other grades of talc.

Explosives for Cement Rock

Extracts from a Bulletin of the Bureau of Mines

By Oliver Bowles

The types of explosives commonly used in quarrying rock for cement manufacture are "straight" nitroglycerin dynamite, ammonia dynamite, gelatin dynamite, low-freezing dynamite, and nitro-starch blasting powder.

Straight nitroglycerin dynamite was in past years commonly employed for primary shots, but recently has given place largely to ammonia dynamite and nitrostarch blasting powder. The compositions of typical explosives of the former type are shown in Table 1.

TABLE I.—Compositions of 40 per cent and 60 per cent "straight" nitroglycerin dynamites

Ingredients	40 per cent strength	60 per cent strength
Nitroglycerin	40	60
Wood pulp	15	16
Sodium Nitrate	42	24
Calcium or magnesium carbonates	1	1
	100	100

Ammonia dynamite is now commonly employed. Its tendency to absorb moisture condemns its use in wet quarries. The compositions of typical ammonia dynamites sold in the United States are shown in Table 2.

TABLE 2.—Compositions of typical 40 per cent and 60 per cent ammonia dynamites

Ingredients	40 per cent strength	60 per cent strength
Nitroglycerin	22	35
Ammonium nitrate	20	30
Sodium nitrate	42	24
Combustible material	15	10
Calcium carbonate or zincoxide	1	1
	100	100

In quarries where much water is encountered gelatin dynamite has been used with success. Gelatin dynamite contains a small percentage of nitrocellulose, which gelatinizes the nitroglycerin and renders it impervious to water. The compositions of typical gelatin dynamites as sold in the United States are shown in Table 3.

TABLE 3.—Compositions of typical 40 per cent and 60 per cent gelatin dynamites

Ingredients	40 per cent strength	60 per cent strength
Nitroglycerin	33.0	50.0
Nitrocellulose	1.0	1.9
Sodium nitrate	52.0	38.1
Combustible material	13.0	9.0
Calcium carbonate	1.0	1.0
	100.0	100.0

Low-freezing dynamites are recommended for blasting in winter. Their freezing point is about 35° Fahrenheit. Other types of explosives may be kept from freezing, or if frozen may be safely thawed by using proper apparatus, but there is still danger that the explosive may become chilled from the air or from the cold rock while being loaded. Compositions of typical low-freezing dynamites are given in Table 4.

TABLE 4.—Compositions of typical 40 per cent and 60 per cent strength low-freezing dynamites

Ingredients	40 per cent strength	60 per cent strength
Nitroglycerin	30	45
Nitrosubstitution compounds	10	15
Combustible material	15	16
Sodium nitrate	44	23
Calcium or magnesium carbonate	1	1
	100	100

Nitrostarch blasting powders are used in a number of quarries. They are relatively insensitive to shock and are consequently safer to handle than more sensitive types. The compositions of typical nitrostarch blasting powders used in the United States are given in Table 5.

TABLE 5.—Composition of typical 40 per cent and 60 per cent strength nitrostarch blasting powders

Ingredients	40 per cent strength	60 per cent strength
Nitrostarch	40.0	46.0
Sodium nitrate	52.5	38.5
Ammonium nitrate	3.0	14.0
Sulphur	3.0	...
Oil	0.5	0.5
Chalk	1.0	1.0
	100.0	100.0

Much useful information on the use of explosives in quarrying may be found in Bulletin 80 of the Bureau of Mines.

An important feature of explosives, from the quarryman's viewpoint, is the rate of detonation. Explosives that have a relatively slow rate of detonation, such as the lower grades of nitroglycerin dynamite, tend to push out masses of rock rather than to shatter them, or, in other words, the effect is propulsive rather than disruptive. On the other hand, explosives that have a rapid rate of detonation, such as the higher grades of nitroglycerin dynamite, tend to shatter the rock; that is, their effect is primarily disruptive. In blasting rock for the manufacture of cement, the aim of the quarryman is to break the rock into small pieces, hence the explosive used should have great disruptive force. "Straight" nitroglycerin and gelatin dynamites develop the strongest disruptive force of any of the ordinary explosives available for quarry work.

Gases Evolved by Explosives

Carbon monoxide and hydrogen sulphide are the two most common poisonous gases formed by the detonation of explosives. Hydrogen sulphide can be easily recognized by its strong characteristic odor. Carbon monoxide is invisible and odorless and its effects are swift and deadly. It is, therefore, the most to be feared of all the gases evolved. Carbon monoxide is produced chiefly by the low-freezing and "straight" nitroglycerin dynamites, and hydrogen sulphide by the gelatin dynamites and black blasting powder.

Considerable quantities of the oxides of nitrogen may be formed when the explosive burns rather than detonates. This may occur from the side-spitting of a fuse or through the use of weak detonators. After careful determinations, Mann found that where complete detonation occurs, very small amounts of the oxides of nitrogen are formed.

The fact should be emphasized that when detonation is incomplete, poisonous gases of various kinds are produced in excessive amount. Therefore, greater

safety, as well as increased efficiency, is brought about by strong and complete detonation of the charge.

As most quarrying is of the open-pit type, the gases from small blasts can usually escape readily. Where large blasts are fired, however, especially in deep quarries, sometimes too little attention is given to the dangers from the gases evolved. An instance has been recorded of the poisonous gases resulting from a heavy blast causing the death of 7 men and rendering 40 others unconscious. They entered the quarry about one-half hour after the blast had been fired. Obviously, after a large blast, sufficient time should be allowed for the gases to escape before anyone is permitted to enter the quarry. In any event enough time should be allowed to render the men safe from possible delayed explosions.

In a number of cement-manufacturing localities the rock is mined, and as the blasting is in tunnels the pres-

Where blasting is conducted in confined drifts, the use of a jet of compressed air at the face assists in driving the poisonous gases away. Where work is carried on in several places simultaneously, it is wise for the men, after a blast has been fired, to work for a few hours at another breast and thus allow sufficient time for the gases to escape.

Amount of Explosives for Primary Shots

In proportioning a charge, good judgment should be exercised. The object to be kept in view in blasting is to shatter the rock into reasonably small pieces and at the same time move it as little as possible.

There are several disadvantages in blasting in such a manner that the rock is thrown too far. The most obvious loss in overcharging is the waste of explosive involved. Also, if the rock is scattered far from the face, the cost of loading the scattered fragments is

TABLE 6.—Number of Tons of Limestone per foot of Drill Hole for Various Spacings and Burdens.

Burden of drill holes.	Spacing of drill holes, feet.															
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Feet	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
5	2.08	2.52	2.92	3.36	3.78	4.20	....	....	....	.....	.....	.....	....	.....	.....	.....
6	2.52	3.02	3.52	4.03	4.53	5.04	5.54	....	....	.....	.....	.....	....	.....	.....	.....
7	2.94	3.52	4.11	4.70	5.29	5.88	6.46	7.05	....	.....	.....	.....	....	.....	.....	.....
8	3.36	4.03	4.70	5.37	6.04	6.72	7.39	8.06	8.73	.....	.....	.....	....	.....	.....	.....
9	3.78	4.53	5.29	6.04	6.80	7.56	8.31	9.07	9.82	10.58	.....	.....	....	.....	.....	.....
10	4.20	5.04	5.88	6.72	7.56	8.40	9.24	10.08	10.92	11.76	12.60	.....	....	.....	.....	.....
11	....	....	6.46	7.39	8.31	9.24	10.16	11.08	12.01	12.93	13.86	14.78	....	.....	.....	.....
12	....	....	....	8.06	9.07	10.08	11.08	12.09	13.10	14.11	15.12	16.13	17.13	.....	.....	.....
13	....	....	....	....	9.82	10.92	12.01	13.10	14.19	15.28	16.38	17.47	18.56	19.65	.....	.....
14	....	....	....	....	....	11.76	12.93	14.11	15.28	16.46	17.64	18.81	19.99	21.16	22.34	.....
15	....	....	....	....	....	.....	13.86	15.12	16.38	17.64	18.90	20.16	21.42	22.68	23.94	25.20
16	....	....	....	....	....	.....	.....	16.13	17.47	18.81	20.16	21.50	22.84	24.19	25.53	26.88
17	....	....	....	....	....	.....	.....	.....	18.56	19.99	21.42	22.84	24.27	25.70	27.13	28.56
18	....	....	....	....	....	.....	.....	.....	19.65	31.16	22.68	24.19	25.70	27.21	28.72	30.24
19	....	....	....	....	....	.....	.....	.....	20.74	22.34	23.94	25.53	27.13	28.72	30.32	31.92
20	....	....	....	....	....	.....	.....	.....	.....	23.52	25.20	26.88	28.56	30.24	31.92	33.60
21	....	....	....	....	....	.....	.....	.....	.....	24.69	26.46	28.22	29.98	31.75	33.51	35.28
22	....	....	....	....	....	.....	.....	.....	.....	.....	37.72	29.56	31.41	33.26	35.11	36.96
23	....	....	....	....	....	.....	.....	.....	.....	.....	28.98	30.91	32.84	34.77	36.70	38.64
24	....	....	....	....	....	.....	.....	.....	.....	.....	.....	32.25	34.27	36.28	38.30	40.32
25	....	....	....	....	....	.....	.....	.....	.....	.....	.....	33.60	35.70	37.80	39.90	42.00
26	....	....	....	....	....	.....	.....	.....	....	.....	.....	.....	37.12	39.31	41.49	43.68
27	....	....	....	....	....	.....	.....	.....	....	.....	.....	.....	38.55	40.82	43.09	45.36
28	....	....	....	....	....	.....	.....	.....	....	.....	.....	.....	.....	42.33	44.68	47.04
29	....	....	....	....	....	.....	.....	.....	....	.....	.....	.....	.....	43.84	46.28	48.72
30	....	....	....	....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	47.88	50.40

ence of poisonous gases may constitute a grave danger to the workmen. For underground work those explosives should be selected that will break the rock efficiently and at the same time evolve a minimum of poisonous gases. Through experiments conducted by the Bureau of Mines, it was found that the amount of poisonous gases evolved could be decreased by reducing the proportion of combustible material in the explosive and in the paper wrapper containing it. Such a reduction has the effect of increasing the amount of oxygen available for combustion. The tests showed that the proportion of poisonous gases was lowest with gelatin dynamite and may be further reduced by diminishing the content of combustible material, and also by substituting flour for sulphur, wood pulp, or resin in the combustible portion of the explosive. It is recommended, therefore, that for underground blasting a "40 per cent" gelatin dynamite of the following composition be used:

Special Formula for 40 per cent Strength Gelatin Dynamite

Nitroglycerin	33
Nitrocellulose	1
Sodium nitrate	54
Combustible material	11
Calcium carbonate	1
	100

excessive where steam shovels are employed. The disadvantage of overcharging is, in this respect, most pronounced where the face is high.

Moreover, the tracks for cars or steam shovels are usually close to the quarry face. If the tracks are where rock may be thrown on them by the blast, considerable time and labor are required to move them, or, if left in position, to remove obstructions and repair damage caused by flying rock. Furthermore, the danger to the workmen is great where rock is likely to fly long distances.

Good Judgment and Experience Required

Lack of good judgment on the part of a blasting foreman may cause much trouble and annoyance to the men handling the rock. An instance was noted where, through poor judgment, the blasting foreman advised removal of the tracks from the vicinity of the quarry face. When the shot was fired the rock was moved so little that no damage or obstruction would have been caused to the tracks. For a subsequent shot the foreman expressed the opinion that the tracks were in no danger. When the shot was fired they were buried with rock.

Good judgment in determining the amount of explosive necessary is manifested also in the effect produced on the rock mass. When drill holes in a low bench are loaded too heavy, the blast tends to throw out a trench along the line of holes. When this takes

place the rock near the holes is thrown too far and, at the same time, the blast loses much of its effectiveness for shattering the rock farther from the holes. The throwing out of a trench in this manner is known locally as a "chimney" shot. At one quarry visited where an overcharged blast was fired the charge was sufficient to blow out a trench nearly to the bottom of the quarry face, which at that point was 22 feet high. On the other hand, if the holes are loaded too light the rock is insufficiently shattered and much secondary blasting is required.

On a bench less than 30 or 35 feet high the ideal shot thoroughly shatters the mass and moves it but little from its original position. This result is best accomplished by employing the "buffer" method. As a result of such a shot, the mass of shattered rock may, on account of the air spaces formed within it, stand up several feet higher than the face, and is in excellent condition for loading with steam shovels.

Success in loading drill holes depends on good judgment and experience. Experience gained in one locality may not serve for another locality on account of variations in local conditions. Each rock deposit has its own peculiar features, and it is only by long experience that one can become sufficiently familiar with the conditions to attain a high degree of efficiency in blasting.

Calculation of Charge

Mere guesswork in proportioning the charge cannot be too strongly condemned. Many failures of shots are due to the crude methods of determining the amount of explosive used. When churn-drill methods are first tried, a common mistake is to make the burden too heavy. It is then impossible to place enough explosive in the drill holes to effectually shatter the mass of rock blocked out. Blasting in churn-drill holes, as practiced in many quarries at the present time, involves large costs for drilling and explosives for a single shot. Where the cost of one shot may reach several thousands of dollars, failure of the shot results in considerable loss. Success in blasting depends largely on the proper proportioning of the charge, consequently a careful and systematic method of determining the charge should be followed.

The best method is to calculate the tonnage of rock to be moved and to proportion the charge accordingly. The tonnage in short tons may be easily calculated by multiplying together the length, breadth, and height, in feet,, of the mass to be moved, multiplying this product by the weight of a cubic foot of the rock, and dividing by 2,000. An average weight per cubic foot of solid limestone is 168 pounds. If a reliable determination has been made of the weight of the rock in any quarry, the figure obtained may be used in place of 168.

If, for example, the length of the mass of rock to be shot down is 200 feet, the width 25 feet, and the height 80 feet, the approximate tonnage would be

$$\frac{200\times 25\times 80\times 168}{2{,}000}=33{,}600 \text{ tons.}$$

The amount of explosive required for a given tonnage depends on the physical properties of the rock, such as hardness, soundness, the attitude of the beds, and aslo on the type of explosive employed. As a rule, 1 pound of the explosive ordinarily used in churn-drill holes is sufficient for breaking 4 to 5 tons of rock. An exact figure can be determined only by experience.

Concrete Highways for Defiance County, Ohio

Plans Based on Future Traffic Requirements—Some Details of Pavement Consideration

By Frank G. Blue

County Engineer, Defiance, O., President, Northwestern Ohio County Surveyors' Association

After a careful study of the problems involved in future successful highway construction in Defiance county, Ohio, it became evident that if a highway system was to be built that would serve the needs of the community and ultimately result in an asset with a return on the investment instead of a liability, a carefully planned program must be mapped out.

It was with this plan in view, having due consideration for the trend of traffic to the highways and with the approval of the general public that our county officials several years ago started the present highway program which, when completed will result in efficient highway service the year around for all classes of traffic, will serve the majority of the public most, will complete most of our state system and return a big income on the original investment.

From past experience in highway building and from close observation of the results obtained with various types of pavement it became evident that future construction must be adequate to take care of traffic requirements and still be low in cost of maintenance; and that the first cost, often the prime factor in determining types, should be secondary to operating and maintenance costs.

First Road Proves Success

Our first concrete pavement was constructed on the inter-county highway between Defiance, our county seat, and Hicksville, the community and farm center

A view of the completed road

in the western part of the county. This highway, 5 miles in length, has now been in service for 6 years and through its satisfactory service was one of the determining factors in the selection of concrete for the balance of our program.

In 1917 an additional 5-mile contract was constructed on the road between Ney and Farmer Center serving the adjacent farming community where the production of sugar beets has reached a high stage and where efficient transportation was a necessity. This resulted in an increasing sentiment for hard surfaced highways and during the year of 1919 an extensive program involving 33 miles was placed under contract.

These contracts, when completed, will make a total of 43 miles of concrete highways. It may be interesting to note that the majority of this program was financed equally by the county, the township in which the project is located and the adjacent property, the

state participating to the extent of only $72,000 and the Federal government to the extent of $27,500. However, present indications are that more state and federal co-operation will be obtained and surveys and legislation are now under way for an additional 37 miles on the state system and 16 miles on our county system. This program when completed will connect most of our rural centers with the county seat and will complete the greater part of the state system.

Macadam for Secondary Roads

Prior to the time of planning the present program 62 miles of macadam and stone roads had been constructed, most of which were of secondary importance to the main routes. A few sections of this type still exist on the main routes but this practice has been discontinued since the increase of traffic and macadam construction is now confined to the light traffic roads.

In general, construction has been of a high order and the majority of the work has been constructed by local contractors who are well equipped with concrete highway equipment. Mechanical finishing machines have been used on several contracts and excellent results have been obtained.

When general conditions will permit it is hoped to complete the present program by 1923 and our efforts will then be concentrated on roads of secondary importance in their respective order.

The financing of this system has involved many problems and we take pride in mentioning the results obtained, considering the fact that the assessed valuation of the county is only about $45,000,000. Highway expenditures for new construction to date covering the last 7 years have been as follows: Federal appropriations $27,500, state $99,000, and county $1,852,812.70. This latter is apportioned as follows: townships-at-large $560,273.51, special assessments on adjacent property $506,777.19, and the balance on the county-at-large.

The accompanying illustrations are views of construction on the Bryan-Defiance Inter-County Highway No. 305, Sec. B. This section is 17,958 ft. long by 15 ft. wide and contains a paved area of 29,928 sq. yds. The pavement slab has a crown of 2 ins. and is 6 ins. thick at edges and 8 ins. at the center.

Concrete consisted of a 1:3½ mix in which "Mason" Pit run gravel was used. The pit was located about 3 miles from the work. At the pit gravel is excavated by a Saureman dragline cableway excavator operating in water having a depth of about 60 ft. Aggregate is very clean and samples tested at Ohio State Highway Department showed 65% of the material passing a ¼-in. screen.

Sec. A of the same highway was 3,328 ft. long by 18 ft. wide and was reinforced with steel mesh weighing 25 lbs. per 100 sq. ft. Concrete was mixed by a ¾ yd. Austin paver and was finished by means of a wooden template which was also used to tamp the concrete. The tamping and shaping was followed by a thin board used the same as a belt in the final finishing.

Curing was obtained by ponding. On grades it was not necessary to leave the temporary water pipe line in place as by removing cross dikes the water from one pond was permitted to flow into the lower ponds. Cross dikes were built in the lower areas as the water reached the proper level in each pond. This method saved time and water therefore it also saved money.

During construction slump tests were made on samples of concrete taken from the same batches of concrete from which material for test cylinders was obtained. The slump tests and crushing tests are shown herein.

Slump and Crushing Test Results

Lab. No.	Slump Test. Ins.	Crushing strength Lbs. total.	Crushing strength Lbs. per sq. in.
F-48	3⅞	102,700	3620
F-49	2½	88,100	3110
F-51	1½	103,100	3640
F-52	2½	101,300	3580

Slump tests were made by means of a 3 by 6 by 12 in. truncated cone.

Work on Sec. A of the Bryan-Defiance Inter-County Highway was started in 1919 by Roach & Smith, of Defiance, O., and completed in October, 1920.

A Valuable New Discovery

Since the war when a great many ditches were blasted with dynamite because of the shortage of labor and the necessity for speed, the method has been quite popular with contractors who are familiar with it.

As a general thing the propagated method of blasting has been preferred, because thereby is saved the time of priming all bore holes in the line of the shot and the time of wiring up the charges.

However, a propagated shot requires the use of straight N. G. dynamite, and because it freezes and chills at a comparatively high temperature, it has been possible to use it successfully for propagated ditch blasts, especially in the north, only during the five warm months of the year.

But now the discovery has been made by the laboratories of one of the powder makers of a formula for making a low freezing straight N. G. dynamite. It is anticipated that the use of this new explosive will extend the period during which propagated blasting may be successfully done to eight or nine months of the year.

As everybody knows, February is a cold month in northern Minnesota. In order to test the new dynamite, some of it was used on February 21st on a ditch that was being blasted by the St. Louis county engineer.

The dynamite had been stored all winter in a Duluth magazine in the original unopened cases. Ordinary straight dynamite would have been frozen solid under the circumstances, but when taken from the box, this low freezing dynamite was soft and in perfect condition for immediate use in spite of the fact that the temperature a week previously had been 18 degrees below zero, and there had been no weather intervening that would have caused thawing had the dynamite been frozen.

As used on the county ditch, it was loaded into wet, cold soil in bore holes drilled through 24 inches of frozen ground. The temperature of air and water at the time was about 30 degrees above zero. The frost was not thawing.

The shot propagated perfectly.

In spite of frozen soil down to a depth of 18 to 24 inches, a ditch 9 feet wide and 2 to 2½ feet deep resulted.

To prevent an uneven, jagged bank line, notches or small trenches were cut where it was desired the side lines should be.

The only cleaning necessary after the blast consisted in lifting out some chunks of frozen soil that fell back in the ditch.

The foreman in charge of the work stated that the new dynamite gave them the cheapest yardage cost of any ditch they have ever put through in St. Louis county in winter.

News of the Cement Mills

The Interstate Commerce Commission has held that the refusal of the Chesapeake & Ohio railroad to switch and spot cars at the plant of the Lehigh Portland Cement Company, at Fordwick, Va., beyond the present points of interchange, or to compensate the Lehigh company for the performance of such service, is not unreasonable nor discriminatory.

The International Cement Corporation has made arrangements for the acquisition of the Knickerbocker Portland Cement Company, the stock of which consists of 16,132 shares of $100 par value preferred and 155,670 shares of $10 par value common.

Mill C, of the Coplay Cement Manufacturing Co., which has been working on a half-time basis, is now operating on a capacity schedule.

The Petoskey Portland Cement Company plant during July made a total of 62,500 barrels of cement, exceeding the normal output by 2,500 barrels, according to John L. A. Galster, secretary of the company, today.

Cement shipped during the month amounted to 63,750 barrels, 1,250 barrels being taken from the reserve supply of the company. Mr. Galster reports that the machinery of the new plant is working smoothly and efficiently and that work in all departments has been well organized for quantity as well as quality production.

The Oklahoma corporation commission was asked to assume jurisdiction over the Oklahoma Portland Cement Company of Ada and the Dewey Portland Cement Company of Dewey, in a petition filed yesterterday by Attorney R. G. Meriott of Oklahoma City.

The commission is asked to act under authority of Section 8220 of the revised laws of 1910, which gives the corporation commission authority over rates and practices of any business which has a virtual monopoly or deals in any commodity of public necessity in such a manner as to make its business of public consequence.

The petition alleges that the cement companies named have such a monopoly and control prices. The commission is asked to hold a hearing to determine whether or not they should be placed under the control of that body. An absolute denial that any connection whatever exists between the two cement companies was issued by the Oklahoma Cement Co.

The Missouri house of representatives passed a bill by a vote of 108 to 11, establishing a state cement commission with power to condemn, purchase or construct a state plant to manufacture cement, brick, lime or tile and appropriating $2,000,000 for the purpose of carrying out this act. This measure was first proposed at the regular session last winter.

The legality of the South Dakota state-owned cement plant was recently upheld when the supreme court denied a writ of prohibition sought by Edwin K. Egan to prevent sale of bonds by the cement commission.

The court held that cement and its product commodities were necessary to the people of the state, and that the manufacture, distribution and sale of it by the state will tend to promote public welfare and secure equality of economic opportunity.

That retail dealers in cement were securing compensation in the sale of cement for which they were giving no service was the complaint of contractors and buyers of cement before the Oklahoma Corporation Commission. The case involved complaints by R G. Merriott of Oklahoma City, who said he was secretary of the Oklahoma Chapter of the Associated Contractors of America. The same conditions were testified to by M. A. Swatek, contractor, Oklahoma City; C. G. Landon, Oklahoma City; R. D. Farmer, Oklahoma City, all contractors, who said they were unable to negotiate sales of cement direct from the manufacturers.

F. E. Tyler, Kansas City, president of the Dewey Portland Cement Company, Dewey, Okla., said that his company preferred to do business through a local dealer, primarily because the dealer was in business all the year round, and that he was prepared to keep the cement in stock, whereas a contractor was not a steady buyer. Mr. Tyler said, however, that the manufacturer was unable to control or restrict the retailer.

Charging that the Southern Pacific company is discriminating against it in tariffs for cement transportation, the Pacific-Portland Cement company of Cement, Solano county, Calif., recently filed a complaint with the State Railroad Commission. The Pacific-Portland company alleges that the Southern Pacific is discriminating in favor of its rivals at Davenport and San Juan. The commission is asked to suspend the rates for 120 days pending an investigation of the case.

A. Y. Gowan, president of the Lehigh Cement Company, and his wife set sail from New York today in a 98-foot motor boat on a cruise around the world. They plan to cruise 40,000 miles in eighteen months. Mr. Gowan expects to touch places that have never been visited by white men.

Michigan Cement Mills, Albion Malleable Iron Company and the Jackson Chamber of Commerce have filed a complaint with the Interstate Commerce Commission against the Ann Arbor Railroad and other carriers participating in the transportation of coal to Jackson, Cement City, Chelsea, Coldwater, Albion, Union City, Fenton, Newaygo and Petoskey, Mich., from Ohio and districts known as the Inner and Outer Crescents, protesting that the rates charged the complainants on coal are unreasonable and discriminatory against them as compared with the rates on coal to Toledo, Detroit and Wyandotte.

The cement mills which are parties to the complaint are the Michigan Portland Cement Co., Chelsea; Newaygo Portland Cement Co., Newaygo; New Egyptian Portland Cement Co., Fenton; Peerless Portland Cement Co., Union City; Peninsular Portland Cement Co., Cement City; Wolverine Portland Cement Co., Coldwater, and the Petoskey Portland Cement Co., Petoskey, Mich.

The establishment of non-prejudicial rates and the award of reparation is asked.

R. B. Koons, who has been manager of the Wolverine Portland Cement Co., plant at Quincy, Mich., during the last 3 years and who was recently promoted to the position of general superintendent of the Coldwater plant, will remove to Coldwater.

D. H. Gibbs, managing director, Portland Cement Supply Co. of Mexico, Ltd., 1st Calle de San Juan de Letrain No. 5, Mexico City, Mexico, was in Chicago last month on his way to London where he expects to remain for about 6 months, his address while in London being Association Portland Cement Manufacturers, Ltd., Portland House, London, E. C. He is interested in two things, one to find a chemist to serve the company at Mexico City and the other being waste heat boilers. In order to study the waste heat boiler, as applied to cement stacks, Mr. Gibbs made a trip to Speeds, Ind., to look at the one installed by the Louisville Cement Co. He also is interested in wall board, stating that his company is engaged in the manufacture of gypsum, which occurs near the limestone deposit. With regard to conditions in Mexico he said railway transportation was poor as a great deal of the rolling stock had been destroyed during the last several years. The company burns oil, which is shipped in from Tampico. Cement manufacture has been a hit and miss affair during recent years, but with the country on a firmer basis he looked for an improvement.

Checks for a 3 per cent quarterly dividend have been mailed all stockholders of the Petoskey Portland Cement company, together with a statement that the officers hope another will be forthcoming on Nov. 1.

The letter is signed by A. B. Klise, president, and John L. A. Galster, secretary, and contains the following optimistic report on existing conditions:

"We are pleased to say that our cement plant and crushers are running in fine shape and business is good. We would be pleased to have you call and inspect the finest cement plant in the United States and satisfy yourself that you have made an investment worthy of being held on to. You, of course, are aware that we have advised you from time to time regarding the progress of our company and have always advised against putting your stock on the market. We are pleased to say that only a few saw fit to dispose of their holdings and we think they will regret it all their lives."

"We hope to send you another quarterly dividend on October 1, and trust that we may be able to continue our dividends."

One of the largest cement manufacturing companies in the United States may build a $2,000,000 plant at Defiance, Ohio, if the natural deposits of limestone, shale and clay found in immense deposits near this city are found to be of proper chemical composition, it is learned from good authority.

G. P. Grimsley, of Baltimore, official in the industrial department of the Baltimore & Ohio railroad, is in charge of the investigation party of Baltimore & Ohio officials who are making an exhaustive investigation here.

A petition of six Michigan cement manufacturing companies that the twenty per cent reduction in freight rates recently announced by the Detroit, Toledo and Ironton railroad be suspended was announced by the state public utilities commission. The petitioners claimed the reduced rate "would tend to affect the traffic of cement manufacturers based upon certain rate conditions into Detroit which supposedly had become stabilized."

Announcement is made by the Atlas Portland Cement Company that, effective Aug. 1, an adjustment of wages, amounting to approximately eight per cent will be made.

International Cement corporation reports net earnings of $499,656 for the first three months of 1921 after deduction of charges, depreciation and taxes, this being equal to $1.86 a share on the 268,429 shares of no par value, compared with $1.25 a share for the last three months of 1920.

On complaint of the Louisville Cement Company of Sellersburg, Ind., the Interstate Commerce Commission has issued an opinion stating that the rates on cement, in carloads, from the company's plant at Sellersburg were unreasonable as compared with rates from the plants of its competitors at Kosmosdale, Ky., and Mitchell, Ind., to destinations in Kentucky and Tennessee. The shipments from the plant of the Louisville Cement Company aggregated 1,656,460 and were moved during the period from July 17 to October 10, 1918, inclusive. The commission has found that the rates assailed were unreasonable to the exent that they exceeded the rates subsequently established on October 14, 1918, and that the Louisville Cement Company is entitled to reparation.

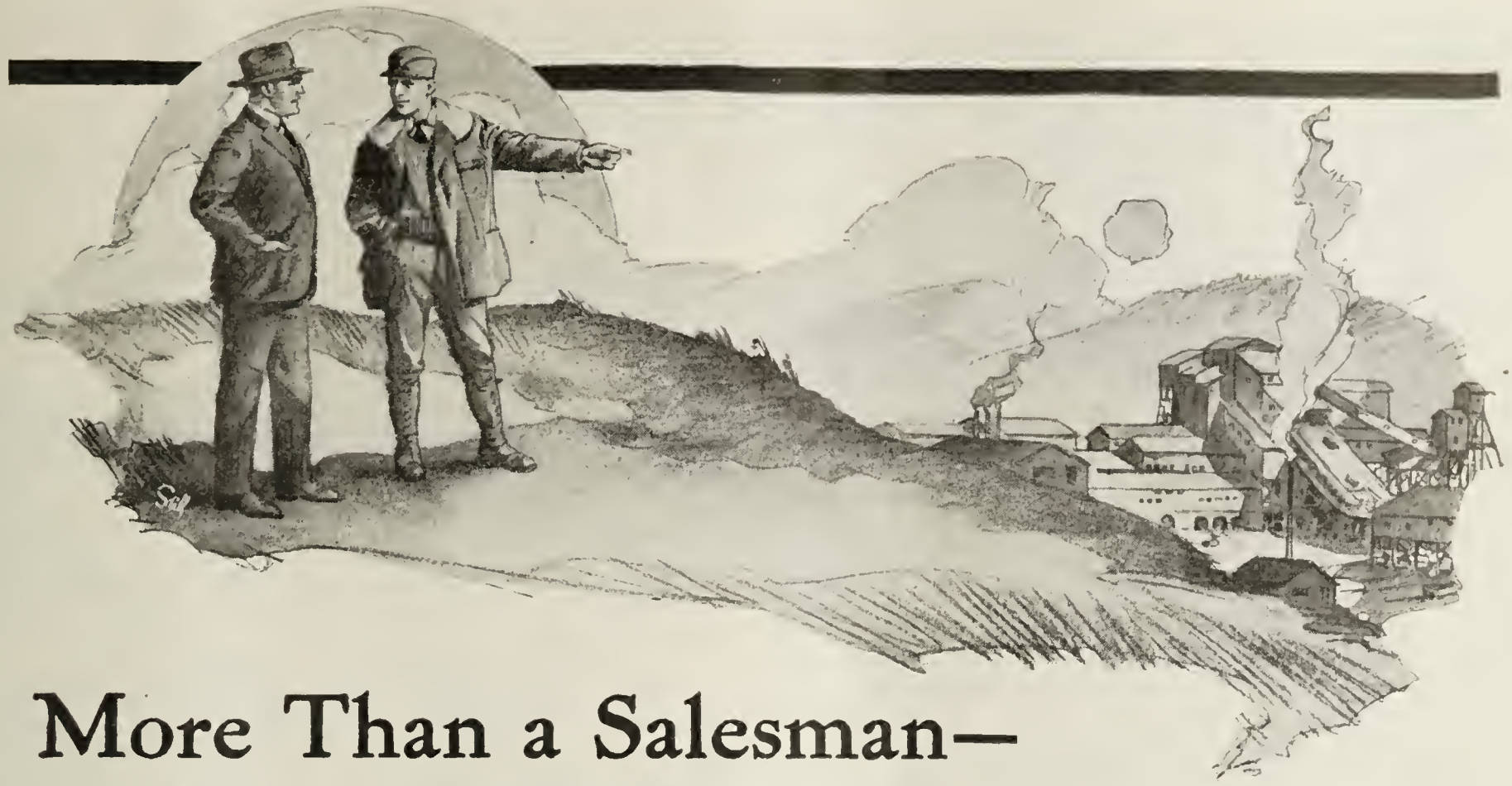
Accident prevention activities have given good results in the Marquette cement plant in Oglesby, Ill. This prevention campaign in that plant shows a reduction in accidents during the period of December 1, 1920 to May 1, 1921 of 81% as compared with the accidents of a like period one year before and a financial saving of 90%, which shows conclusively that where co-operation of employers and employees for safety-first is maintained in a plant accidents are reduced materially.

With 300,000 barrels of cement in storage in the warehouses at the Lehigh Portland Cement Company's plant in Iola, Kans., and with orders trickling in slowly, the plant is to the brink of a forced shut down. This will occur this week. And the period of inactivity is for thirty days. It is hoped by that time storage room sufficient to operate the plant again will have been vacated by shipments.

C. A. Swiggett, General Superintendent of the plant, said: "We have done our very best to keep things moving but we have filled the storage and have even stored a portion of the product in old frame buildings where there is bound to be wastage, all to keep operating. I expect to push the work of rebuilding the rock storage buildings and bins and thus keep most of the men at work during this forced shut down. But we are full up."

The Monarch Portland Cement Co., at Humboldt has resumed operation of two kilns, the Mildred plant is running about bin full and the Ash Grove Cement Co., at Chanute is only operating three kilns.

The Monarch Portland Cement Company, Humboldt, Kans., has resumed the operation of two kilns at its plant in Humboldt, with good prospects for placing two more kilns to work soon. July shipments were good. The plant had been completely shut down for some time.



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Du Pont Products Exhibit—Atlantic City, N. J.

DU PONT

News of the Concrete Products Factories

Among the products turned out at Renn and Company's concrete block factory, Kaukauna, Wis., is a handsome looking white granite faced block that is in deserved demand by builders and which presents a very attractive exterior. This block, according to Mr. Renn, is becoming increasingly popular and the company is making quite a specialty of its manufacture. While the equipment is capable of turning out more than six hundred blocks a day the output has averaged at least half the maximum capacity per day and the sheds are being filled with rows and piles of these blocks, both of white and also rough granite faced blocks although it is hard to keep very far ahead of the depletion caused by the demand for building material.

The company has kept twelve men in its employ throughout the spring and has every assurance for believing that in spite of the prevailing business depression elsewhere the chances are very bright in this section for an enlargement of its equipment as the business is steadily widening.

The Bemidji Concrete Manufacturing company, Bemidji, Minn., began active operations at their new plant last week. Brick and tile experts are on the job and the first material manufactured will be used in the construction of their main building which will house their kilns and brick and tile machines.

Cinder concrete block have made a distinct commercial success for F. J. Straub in New Kensington, Pa. Mr. Straub has a patent on the idea. In his factory water is fed to the Kent Continous mixer from a trough (a water heater boiler split end to end, using about two-thirds the diameter of the cylinder). This makes possible the more rapid introduction of the mixing water than by the use of city water pressure through a small pipe.

The mix is about 1 to 5 and mixing with cinders is necessarily thorough. The mixed concrete is fed on belts to the Besser block machines.

The block have a high absorption—more than 20% —but, properly used, have the characteristics of all so-called popcorn concrete, it having good insulating value when properly sealed outside to prevent penetration of moisture. The ideally insulated wall is one that is broken up into many small air cells. Cinder concrete, particularly when successfully made without sand, approaches that desirable quality.

The problem is in the selection of cinders and in using enough cement to give a block sufficiently strong and then in making the wall water tight outside—in which stucco should make a good construction.

The Victor Silo Co., North Manchester, Ind., have placed on the market Victor combination molds for making concrete staves for silos, coal pockets, corn cribs, etc. The molds are adjustable for staves 2½, 2¾ or 3x10x30 inches. Also fractional and special sizes. Concave and convex edges. The staves are so constructed that when put in place a seaming mortar joint is formed on the inside which perfectly seals and acts as a key which greatly strengthens the wall.

C. H. Blank Coal & Ice Co., Ellwood City, Pa., is constructing a plant for the manufacture of steam cured concrete block, daily capacity 1,500 to 1,800 blocks.

Maryland Concrete Corp., 720 Equitable bldg., Baltimore, Md., will erect a new factory building, 60x100 feet; capable of producing 1,000 concrete block and 10,000 concrete brick daily.

Walter Elsktrot, Hillsboro, Mo., wants to buy a concrete power tile machine, power mixer, leveling instrument, sewer pipe molds from 8 to 24 inches.

Robert A. Douglas, Breedsville, Mich., operates a block machine, mixer, brick machine and Norwalk burial vault molds. Wants prices and catalogs on waterproofing compounds, mica spar crystals, marble chips, white cement, molds for making vases, porch columns, septic tanks, fence posts and flower boxes.

Consolidated Coal Co., 601 Eddy bldg., Saginaw, Mich., operates a Thos. Hammond sewer pipe machine, Blystone mixer and a McCracken drain tile machine.

J. W. Barndt, Garnett, Kans., operates a block machine, Farmers drain tile machine, Hurst silo molds and a Martin mixer. Wants prices and catalogs on crusher, sewer pipe molds, mica spar crystals, and marble chips.

Mayor Abram O. Johnson of Monmouth Beach, N. J., plans to start a concrete block plant patterned after those he saw on a recent trip through Florida. It will be equipped with the most modern up-to-date machines including a Kramer block machine and a Kent Continuous Mixer.

The Concrete Equipment Co., 540 Ottawa St., Holland, Mich., have made a record during the past year in the sale of their molds for making concrete fence posts. Now is the time to start making concrete fence posts. There is more profit in the sale of a concrete post than in a concrete block—many farmers delayed putting out posts on account of the war, the company declare. Now they need posts and are demanding concrete. Concrete equipment post molds cost very little and with proper care lasts a life time. For many years they have been used by railroads, farmers and ranchers. Their system is the most satisfactory and economical, lowest in labor cost and simplest to operate. Their catalog answers all questions, even some that you don't think of now.

H. W. Lackey, 6104 Blackstone Ave., Chicago, is contemplating the manufacture of concrete brick and other products at Waukegan, Ill., and at present is making a selection of a site for his plant.

Floyd Malcolm, concrete contractor, Loveland, Colo., plans to start a silo stave factory this spring and is in the market for modern equipment.

KENT CONTINUOUS MIXER
for CONCRETE PRODUCTS PLANTS

Is your plant equipped with modern machinery that saves labor, holds down your pay roll, and turns out large quantities of QUALITY products at a low cost? You have not the proper equipment if you are mixing concrete with a machine designed in fact for another trade.

The Kent is especially designed for the needs of concrete products plants. It is low in cost, continuous in action, easy to keep in repair and it has a good clean record of 15 years in the industry.

Write today for Catalog No. 8

THE KENT MACHINE CO.
KENT, OHIO

A BIG DEMAND FOR THESE VAULTS
—PROFITS LARGE—

With our Adjustable Steel Molds you can easily make any size of the Automatic Sealing Burial Vault at an exceedingly low total cost.

When once they are seen and used in a community the Automatic Sealing Burial Vaults come into instant demand. They are far superior in every way to any other cement or steel vaults.

The manufacturing of these Automatic Sealing Burial Vaults with our Adjustable Steel Molds is a big money making opportunity. The first ten vaults you sell will more than pay back your entire investment—materials, molds, time, etc., etc.

Write us for complete particulars.

Automatic Sealing Vault Co.
216 E. River St. **PERU, IND.**

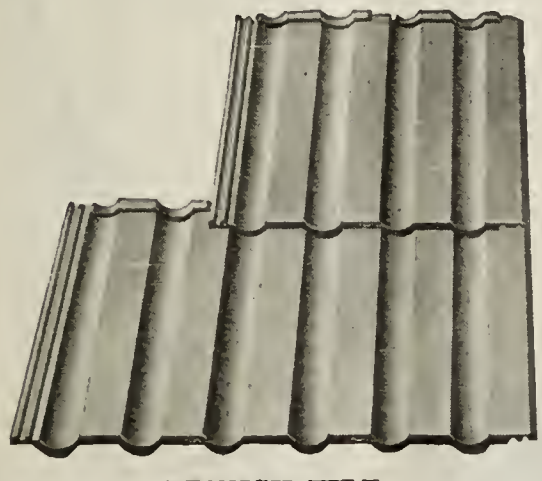
Concrete Blocks, Bricks Building Trim, Posts, Ornamental Work, Etc.
WHEN FACED WITH
Mica Spar Crystals

IS CHANGED INTO
SPARKLING GRANITE
Beautiful, Artistic and Everlasting

Made in six scientifically milled sizes, extremely hard, sharp and free from dust. Insures strength and beauty. Booklet "Micaspar and How to Use It," with free samples mailed on request.

Crown Point Spar Company, Inc.
101 PARK AVE. NEW YORK

THE UNITED STATES CHAMPION CONCRETE ROOF TILES



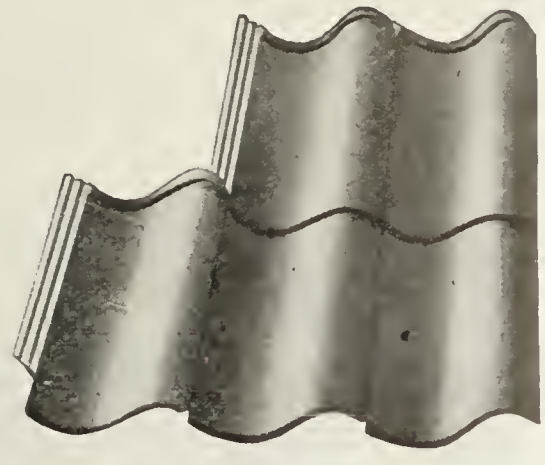
FRENCH TILE

Is a perfect and durable roofing. They firmly interlock and overlap one another in both ends and sides of the tile. A peculiar feature of our tiles only. They are carefully designed in a variety so complete that any roof can be finished beautifully with them. No matter how complicated it is.

For nearly 30 years our tile machinery has been in successful use. Its simplicity, lasting quality and unequaled capacity have created a very great demand for it everywhere when introduced.

Buy the U. S. Champion Tile Machines for making French and Spanish Tile. Their moderate price and superiority to any others will justify your purchase of them. Write us for description and prices.

L. HANSEN CO.
3617 East 23rd St.
Kansas City, Mo.



SPANISH TILE

AJAX CONVEYOR BELTING

IN the Ajax Brand Rubber Conveyor Belting we offer a first class belt for ordinary conveying purposes. The duck and rubber is of good quality and will compare favorably with the good belts now on the market. We make it with a flat or convex surface, and with a cover varying in thickness from one-sixteenth inch to one-fourth inch. For conveying coal, sand, gravel, stone, etc.

Advise us regarding your installations. We make belts for every purpose.

Conveyor Belts *Transmission Belts* *Packing*
Elevator Belts *Hose—all Kinds* *Valves, etc.*

The Gutta Percha & Rubber Mfg. Co.
301 West Randolph Street
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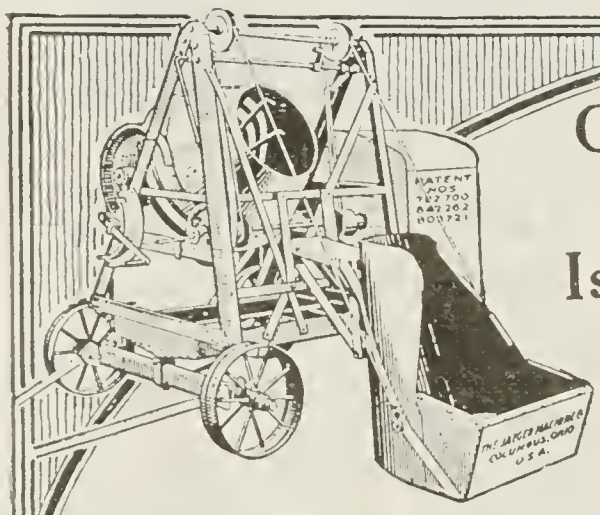
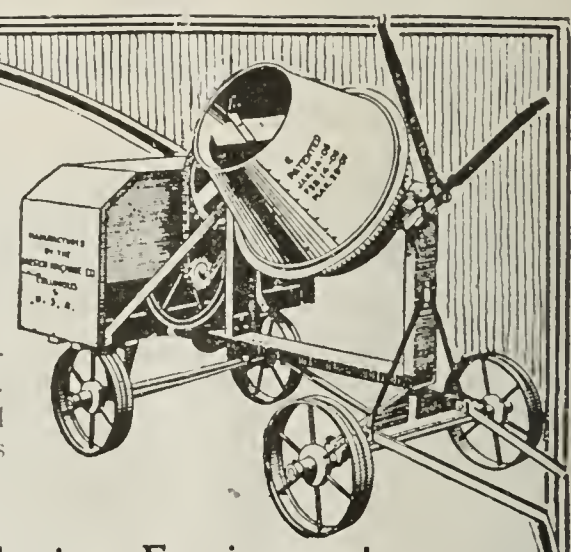
New York Boston Seattle
San Francisco



One Thing Is Certain
THE JAEGER
Is a Bear for Speed

Outfitted with Jaeger mixers and Jaeger Placing Equipment you have the time-saving, labor-saving aids that cut cost and land the better jobs and the bigger profits for you.



A Mixer for Every Job

With three sizes of batch capacities—with fourteen different outfits. No matter what kind of concrete work you have, there is a Jaeger Mixer for you. Each Jaeger Mixer is famous for being efficient, economical, strong, durable, and low in first cost.

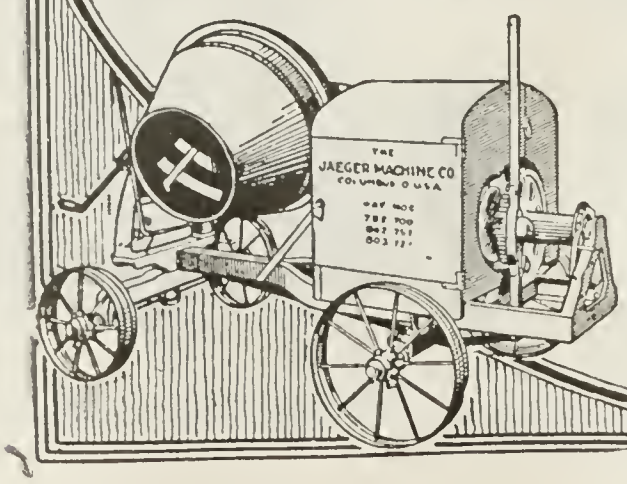
We guarantee the Jaeger Mixers to be constructed of the best material in the best mechanical manner.

Jaeger Placing Equipment

consists of the Jaeger Mixer complete with loader and hoist. Spouting outfit consists of 50 feet of track and 10 foot sections, and adjustable legs. Skip car holds one full batch of concrete and is automatic in dumping and equipped with brakes. The hoist pulls this car up to hopper where it dumps.

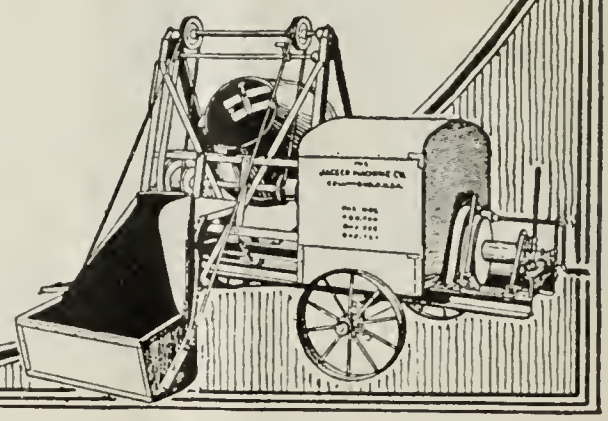
Full information and prices mailed on request.

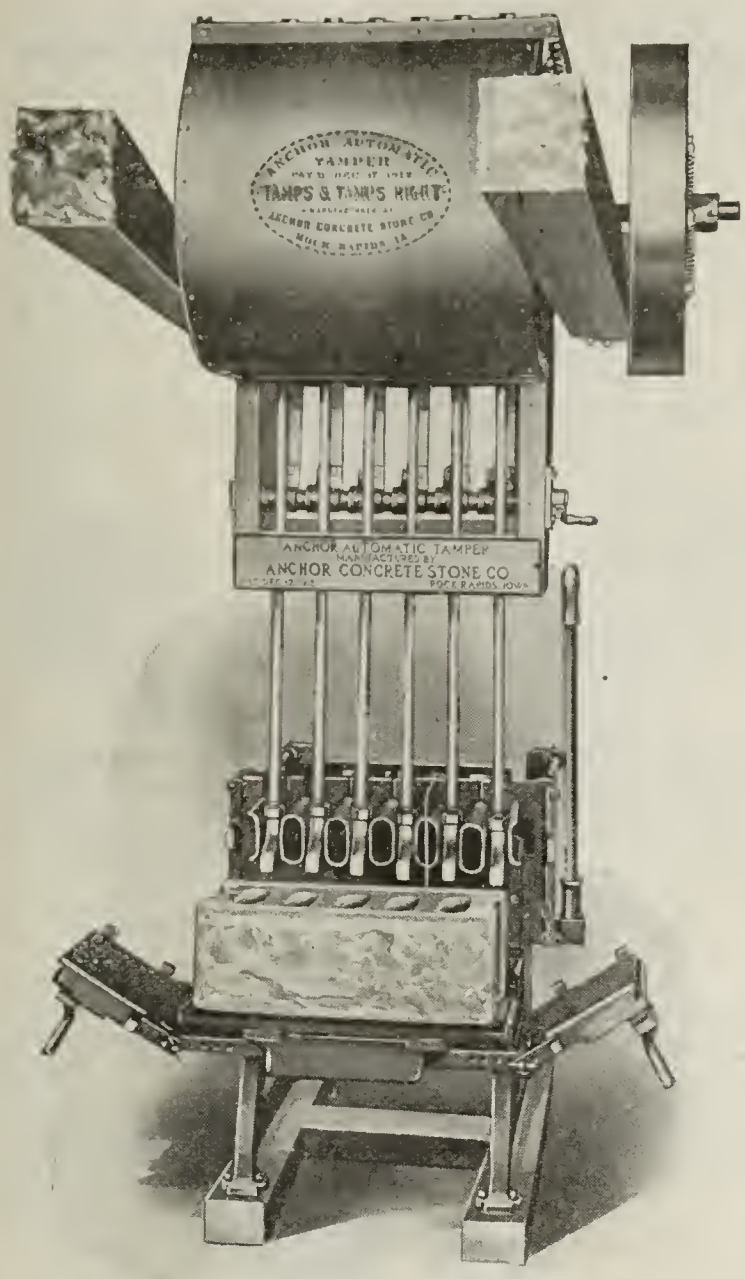
THE JAEGER MACHINE COMPANY **212 Dublin St., Columbus, Ohio**



Quality

Mixers





THE HOBBS BLOCK MACHINE

and

ANCHOR AUTOMATIC TAMPER

will make money for you if you will give them a chance. The finest faced blocks in the world can be made on the Hobbs machine and yet this same machine will make plain blocks very rapidly.

The Anchor Automatic Tamper is made to operate over any type of Block, Brick or Stave machine with satisfaction absolutely guaranteed.

We also manufacture the following well known machines:

The Post Economy Punch

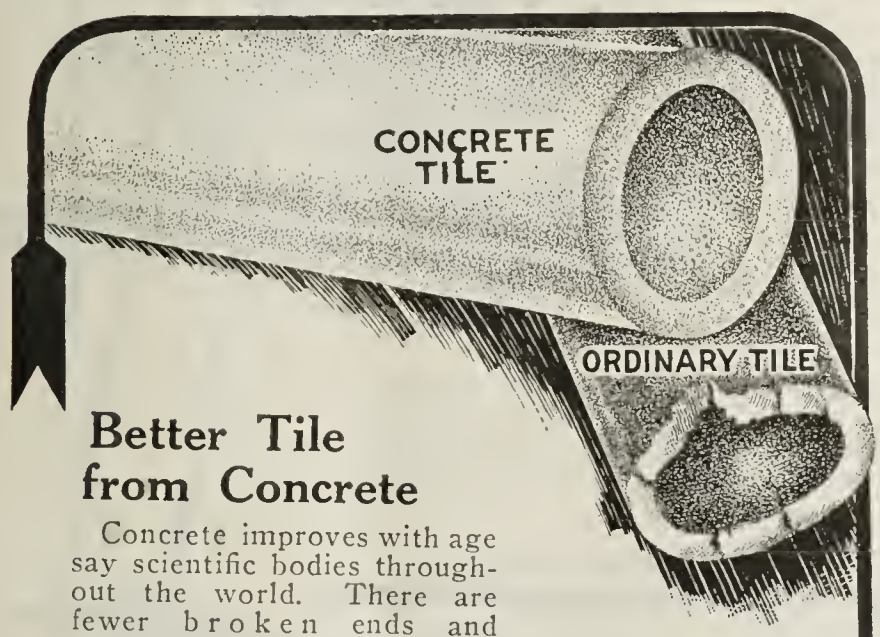
The Anchor Continuous Air Space Block Machine

The Anchor Batch Mixer—a mixer designed for concrete products plants.

Let us tell you more about this reliable line of equipment.

The Anchor Concrete Machinery Co.

Home Office: Rock Rapids, Ia. Branch: Columbus, O.



Better Tile from Concrete

Concrete improves with age say scientific bodies throughout the world. There are fewer broken ends and cracked tiles, when they are made from concrete. They lay up closer, and make a better job, because they are more uniform in shape and size.

Tamping Method Superior

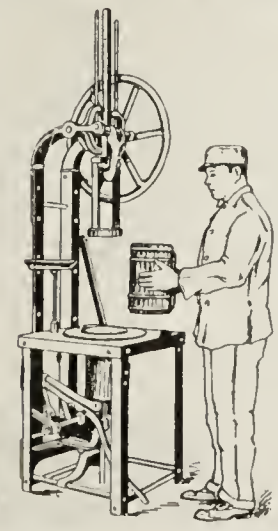
The Bureau of Standard has shown that the tamping method, that principle employed in the Cardiff, is superior to the rotary or pressing method of moulding.

Cardiff Cement Tile Machine

will make its owner from $50 to $100 per week. Cement tile, moulded in a Cardiff Machine make a profitable side line for anyone in a position to follow it.

Write for full description and proofs.

Leavitt Manufacturing Company
370 Griggs St., Urbana, Ill.



Conco Cars

are fast becoming the popular car among tile and block makers because of their durability, convenience in loading, light weight and moderate price.

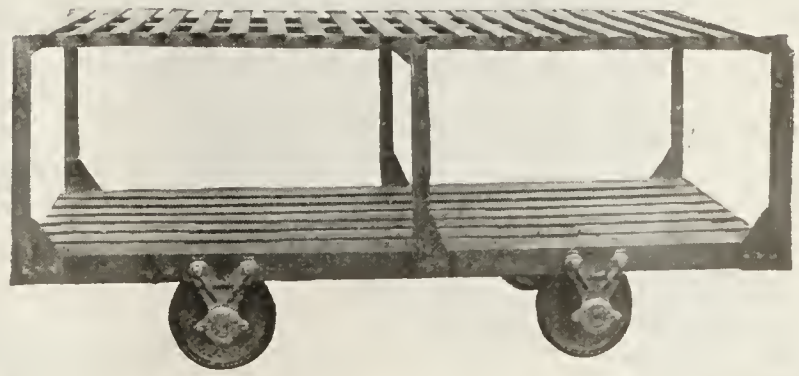
Let us solve your hauling problems.

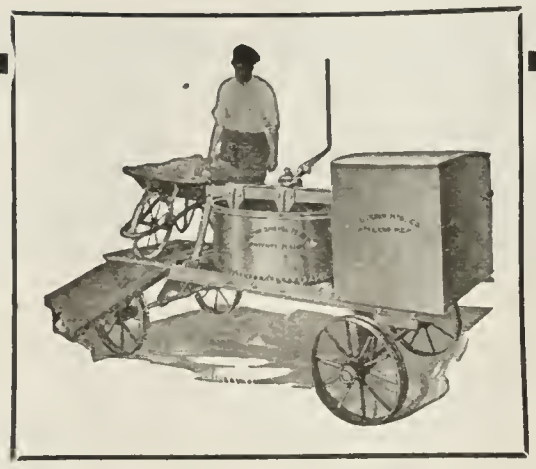
H. D. CONKEY & CO.

Mendota, Ill.

Pulleys—Gears—Hoists

Hyatt Roller Bearings in Stock





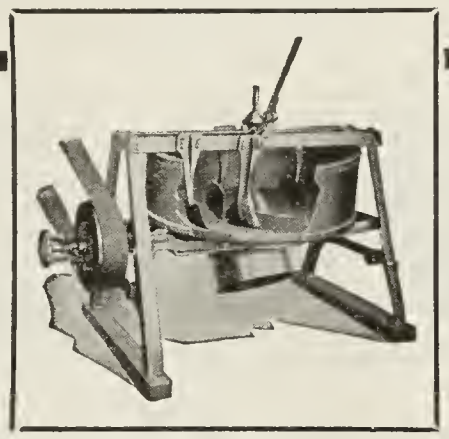
An all-round mixer for all-the-year-round work. Use it on all your concrete, mortar and plaster mixing jobs.

CONTRACTORS USE THIS MIXER ON THREE TIMES AS MANY JOBS

Portable Dunn Shovel Mixers are designed to mix mortar and plaster as well as concrete. They are built to do this work better than you ever had it done before. We want you to expect more service from it than from any other mixer. Don't be afraid of overworking it; keep it busy day after day on all of your mixing jobs. Even if you give it three times as much work to do as you would an ordinary mixer, it won't wear out any sooner.

You'll like the ease by which this mixer is charged, its rapid and convenient bottom discharge, the way it cleans itself, its compactness, portability, sturdiness and dependability. Because it will mix concrete, mortar and plaster and because of its many features, you really get three mixers for the price of one. And you pay no more for it than for an ordinary mixer. Try it out for a couple of weeks before you buy.

Ask Us to Send You Bulletin T-20



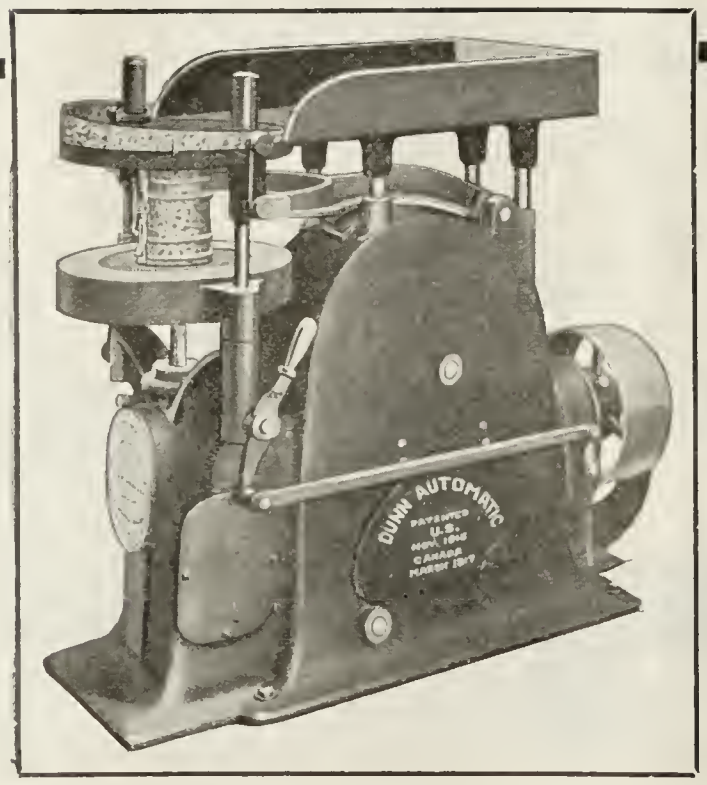
The Dunn Shovel Mixer produces a thoroughly mixed, plastic material because of its four shovels. A hundred times a minute the material is shoveled, stirred and troweled.

It not only saves the labor of one man, but it improves the quality of your products and increases your production. You may try it out before buying.

RUN YOUR PRODUCTS PLANT WITH ONE MAN LESS

With a stationary Dunn Shovel Mixer properly installed you can improve the quality of your products and increase your production with one man less than you are now employing. Simply because power and gravity are utilized to accomplish automatically what you are now doing by hand. The only labor involved in keeping your production machines, whatever they might be, constantly supplied with material is in loading a bucket below the floor level with the unmixed materials.

You'll be interested in knowing that the cost of this complete mixing and conveying equipment is less than that of the ordinary conveyor alone.



Write for Bulletin M-21

THE BUSINESS OF MAKING HOLLOW TILE

The immense demand and market for a more economical, more permanent building unit, such as hollow concrete tile, is readily evident in every community. Supplying this market means a permanent business bringing in large earnings.

It is a big part of our business to completely equip standardized plants for turning out this hollow tile and other products in large quantities at low cost. That we are able to establish you in a most profitable business is demonstrated by the success enjoyed by all Dunn Plant owners.

There's a whole lot to be said about this proposition which will interest you. Drop us a line for particulars.

W. E. DUNN MFG. CO.

414 W. 24th Street

HOLLAND, MICHIGAN

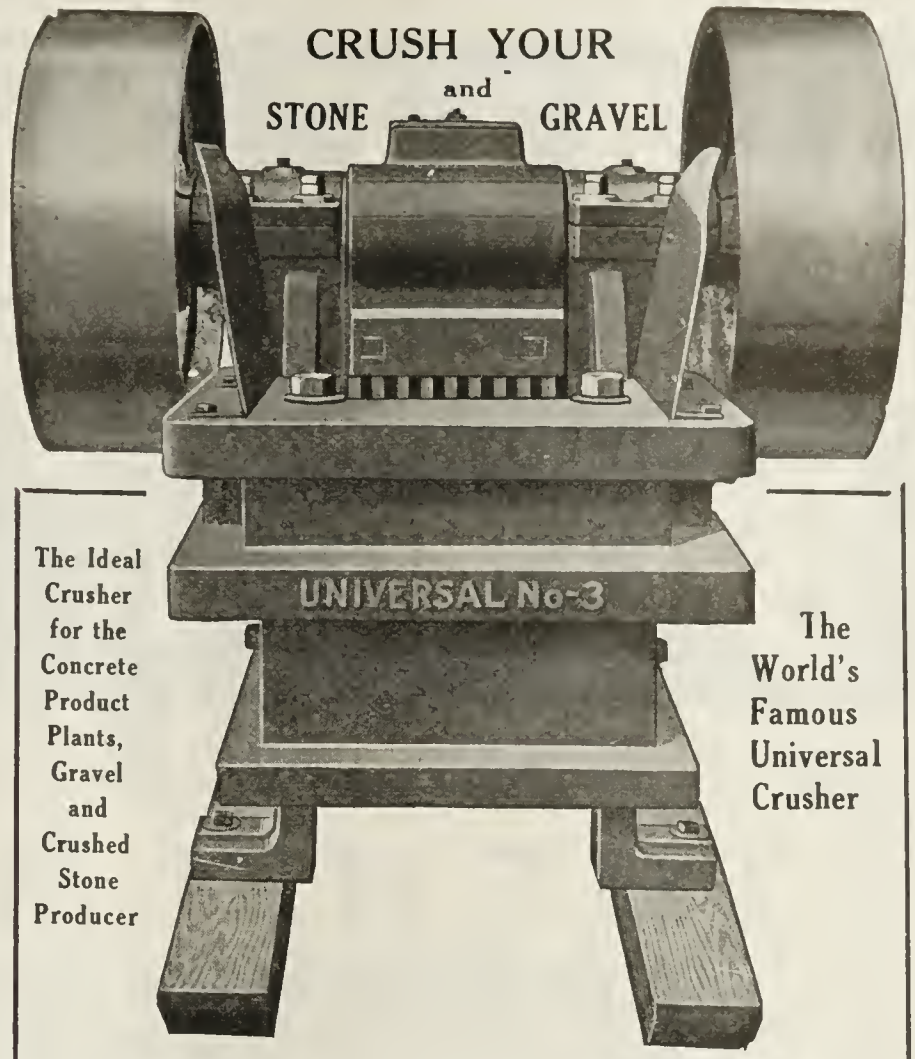
HEADQUARTERS FOR CONCRETE MACHINERY

Money Making
Block Machines
Brick Machines
Concrete Mixers
Block Molds
Ornamental Molds
Drain Tile Molds
Sewer Pipe Molds
Fence Post Molds
Etc., Etc.

Write for Catalog

Concrete Equipment Company
540 Ottawa Street
HOLLAND, MICHIGAN

CRUSH YOUR STONE and GRAVEL



The Ideal Crusher for the Concrete Product Plants, Gravel and Crushed Stone Producer

The World's Famous Universal Crusher

We Build Crushers from 5 Tons to 300 Tons per 10-hour Capacity

Instantly adjusted to produce size required from ¼ inch to 3 inches. *Write for Folder No.* 14.

UNIVERSAL CRUSHER COMPANY
230 Bee Ave. Cedar Rapids, Iowa, U. S. A.

Big Profits Making Septic Tanks
BENEFIT BY OUR EXPERIENCE

After years of successful operation of a Concrete Products Plant, we have experienced in the last six months, the dullest time in its history in the sale of blocks, brick, stave silos and burial vaults. During this time the sale of our Unit System Septic Tanks has increased beyond all expectations. We are shipping them out in single shipments, and car lots, and we are four weeks behind our orders. We sell to the plumbing trade and plumbing jobbers and in some localities we have agents selling directly to the farmer and the villaage house-holder.

Every family who is not situated on a sewer is a prospective customer.

The profitable shipping distance is a radius of about two hundred miles from our plant, and we have decided to offer for sale to other concrete products plants the forms to manufacture Unit System Septic Tanks.

The limitations of this new business are boundless. A sewing machine agent considers two or three sales a week good business, but one of our salesmen sold eighteen installations of our septic tanks three weeks ago last Saturday, in the little village of Erie, Ill., with practically the same profit for each installation as is made on the sale of a sewing machine.

You have little or no competition in your territory. Septic tanks are sold every month in the year. Our customers are community high schools, public schools, offices, stores, churches, hotels, dwelling houses, industrial plants, etc.

Business is good with us. Let us pass these conditions on to you.

For Full Particulars Write

WM. DE LHORBE **Oregon, Ills.**

WATER

WE-FU-GO AND SCAIFE

PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

BELTING

"V-B" Balata
"AMPERE"
(Canvas Stitched)
GRIP-ON
(Impregnated Solid Woven)

Write for Prices, Discounts and Samples

VICTOR BALATA & TEXTILE BELTING CO.

Factory: Easton, Pa. Main Office: 38 Murry St., New York
Stores: 167 N. Market St., Chicago and 85 Purchase St., Boston

CONVEYOR BELTS A SPECIALTY

THE HELM PRESS

has contributed to the building industry the greatest advance toward a perfect, permanent brick and block. Every part of it has culminated from mature experience and is based on sound engineering principles. The Helm press is always built upon the basis of ultimate satisfaction to the user. No pains are spared to use the best materials obtainable and the best workmanship in putting them together.

That is why hundreds of satisfied users employ the Helm press to make their bricks and blocks and why a large percentage of our business is repeat orders.

Helm supplies everything necessary for the complete concrete brick and block factory—plans and installs it—then stands solely responsible for its satisfactory operations. If you are considering installing a new brick or block plant, or changing your present equipment, you are invited to write us—it obligates you not at all and you can't go wrong.

THE PRESS THAT MAKES THE MONEY

THE HELM BRICK MACHINE CO.

764 MITCHELL STREET CADILLAC, MICH.

For FIRE BRICK and DUST

Specify

CRESCENT QUALITY

THE UTMOST IN
FIRE CLAYS

CRESCENT REFRACTORIES CO.

Curwensville, Clearfield Co., Pa.

SELECTED
WHITE SAND

UNEXCELLED FOR

Facing Concrete Blocks, Ornamental Concrete Stone, Hard Plaster, Finishing, Exterior Plastering, Roofing, Stone and Marble Sawing, etc.

Prices, Freight Rates and Samples on Application
Shipped in Paper Lined Box Cars
Small Shipments in 175-lb. Bags

Ottawa Silica Company

OTTAWA, ILLINOIS

Sand Lime Brick Machinery

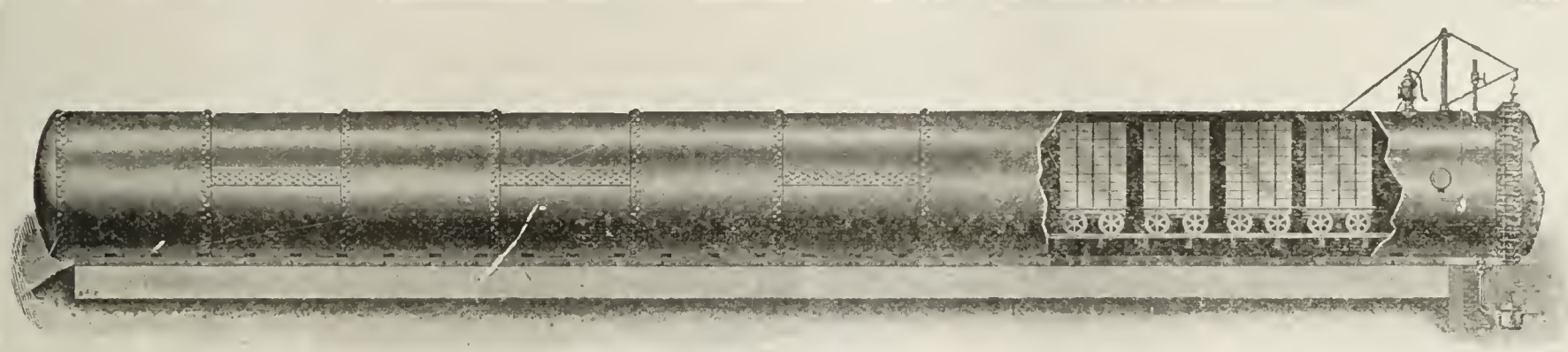
Our complete line of Sand Lime Brick Machinery makes it possible to secure just that machinery which is required to make your plant a success. We favor no particular type of machinery but are guided by the needs of the customer. Our wet and dry grinding mills have transformed a number of unsuccessful plants into dividend producers, while our Presses, Mixers, Hardening Cylinders and other equipment are of equal quality. We can exactly meet the demands of any manufacturer with a quality of machinery which will operate at a profit with a minimum amount of attention and expense.

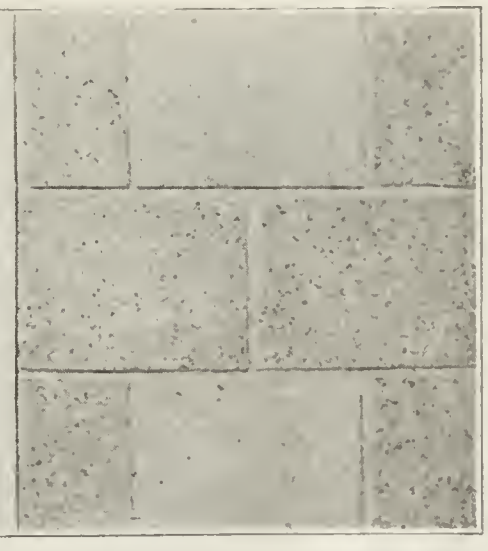
Correspondence solicited

The Hadfield-Penfield Steel Co.,

WILLOUGHBY, OHIO

Formerly The American Clay Machinery Co.





Building Material of Beauty

Minimum absorption, maximum strength, light and easy to lay and produced in style, shape and design to meet any architectural requirements.

INEXPENSIVE **PERMANENT** **POPULAR**

Under one operation the stone are veneered with granite, marble or other natural products and sprayed as they come from the machine, producing a Reconstructed Stone in natures own beauty.

AN OPPORTUNITY

If you are interested in producing a high class building unit of standardized dimension, and desire to invest in a Real Manufacturing Business, WRITE US NOW.

HYDRAULIC RAMMING CONCRETE STONE MACHINERY

LITTLE FALLS **NEW JERSEY**

These Booklets Are Easy to Read and Worth Reading

Pamphlet No. 15
gives details of the various types of dragline cableway excavator installations suitable for general dirt-moving operations, brick and tile plants, and so forth.

Pamphlet No. 14
is a handy compilation of data on the dragline cableway excavator method of excavating and conveying sand and gravel, illustrated with many views of typical installations.

Pamphlet No. 12
describes the latest developments in the use of mechanical drag scrapers for handling gravel from hillside, and explains the adaptability of power scrapers for small pits.

Pamphlet No. 11
illustrates practical solutions of various storage problems by use of scrapers and dragline cableways, some of this information being now published for the first time.

Which of the above pamphlets do you want? Send in your request at once.

SAUERMAN BROS. 1139 Monadnock Bldg., CHICAGO

Patent Pending

Our Late Development of

POWER DRAG SCRAPER

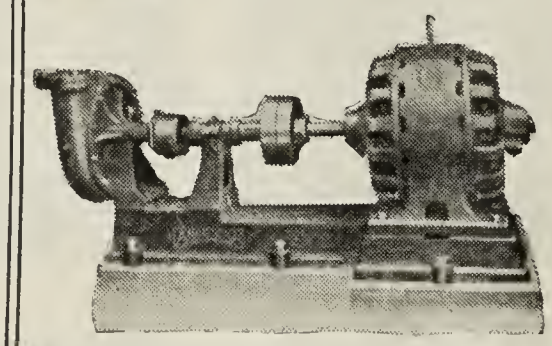
Is proving its worth

We will shortly be prepared to mail you CONCRETE INFORMATION including photographs and drawings of just what it is doing for others during the present year. This information will be especially valuable at this time when you should be familiar with the most economical methods of excavating.

L. P. GREEN
907 Lumber Exchange Bldg.,
Chicago

AMERICAN
TRADE MARK REG'D. U.S. PAT. OFFICE

PUMPS



Built to Meet All Possible Power Plant Requirements

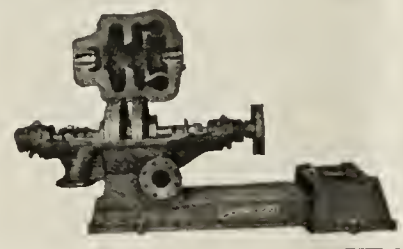
Fifty standard types of centrifugal pumps regularly built and special designs as wanted.

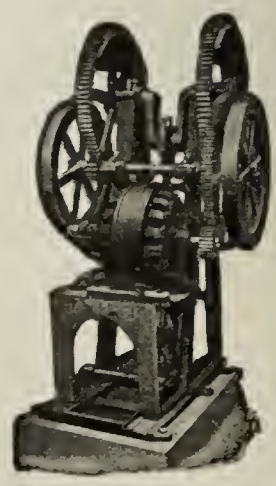
Also a complete line of deep well plunger pumps.

Write for Catalogs.

The American Well Works

General Offices and Works: Aurora, Ill.
Chicago Office: First National Bank Bldg.





SAND PUMPS

That pay the largest dividends per dollar of investment.

"The Pump That Makes The Money."

This Pump is all that is implied in the name

LIGHTNING

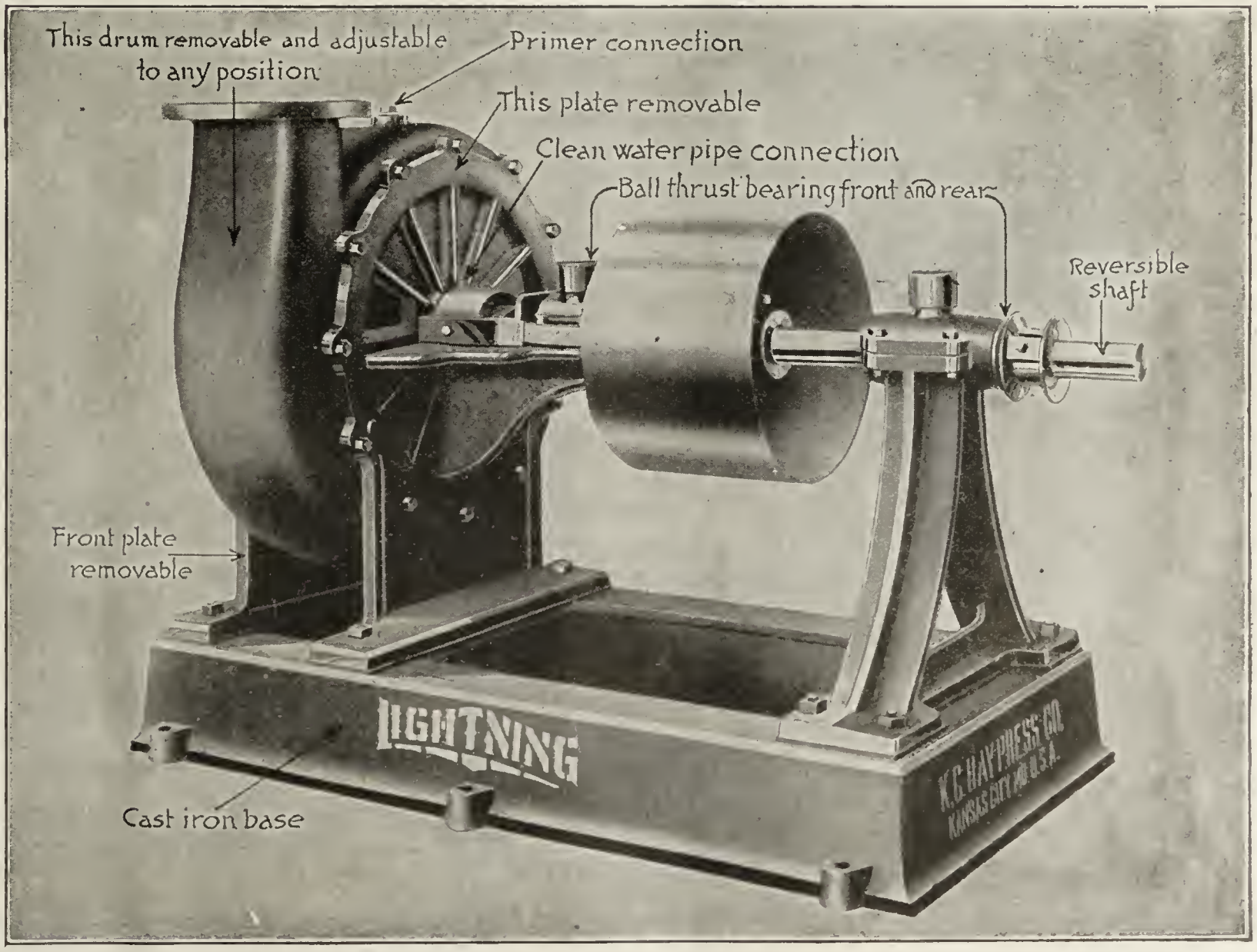
Its rugged construction and Simple operation assures maximum efficiency in operation at all times.

It is easy to adjust and easy to replace parts. Thousands in successful operation are striking endorsement of their dependability.

KANSAS CITY HAY PRESS & TRACTOR COMPANY

KANSAS CITY, MISSOURI

THE PUMP OF SIMPLICITY AND STRENGTH

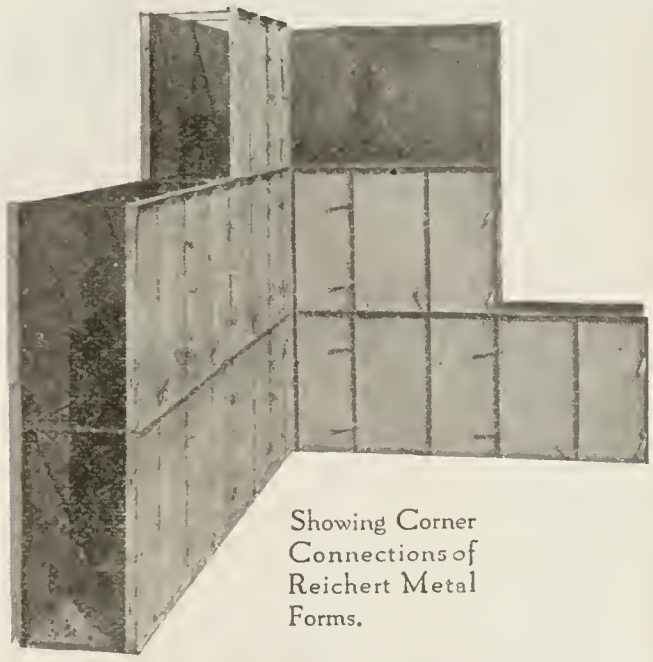


Better Work in Less Time

REICHERT Adjustable Steel Molds will enable you to do better work on Walls and Foundations. Their perfect alignment and close connection guarantees a SMOOTH SURFACE over the entire area of the job.

REICHERT Adjustable Steel Molds will save you valuable time. The Improved Locking Device operates easily, no hammering necessary. Unskilled labor, with brief instruction, can assemble and operate with perfect results.

REICHERT ADJUSTABLE STEEL MOLDS



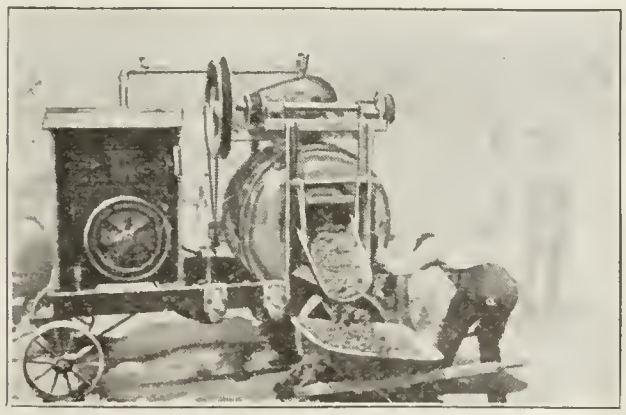
Showing Corner Connections of Reichert Metal Forms.

are standardized, all parts interchangeable, and PERMANENT. One set of Forms will enable you to SAVE TIME AND MONEY on a wide range of jobs, FOR MANY YEARS.

With REICHERT Adjustable Steel Molds in use, you can bid lower on contracts, beat competition, and still maintain the same margin of profit—or actually increase it.

GET THE FACTS. Write us for catalog and full information.

Reichert Metal Concrete Forms Company
1188 Weil Street, Milwaukee, Wisconsin



THE *Atlas* MIXER

Represents the best established practice in Concrete Mixer Construction.

Its dependability and simplicity commends it to the contractor who appreciates the importance of uninterrupted service.

The Atlas is made in various sizes and styles. Let us mail you our catalogue.

Send for it today—NOW

ATLAS ENGINEERING CO.
3023 Lisbon Ave. Milwaukee, Wis.

P. S.—If you are interested in material handling equipment, let us mail you our ATLAS Wagon Loader, Box Car Loader, Car Unloader, Belt and Bucket Conveyor and Portable Storage Bin catalogue. The catalogue is yours, simply ask for it.

THE POLK SYSTEM

All-Steel Machines for All Kinds of

Circular Concrete Construction

We contract grain storages.

Polk Genung Polk Company

521 Occidental Bldg.
Indianapolis, Ind.

Fort Branch,
INDIANA

Henry Heil Chemical Company

210 to 214 South Fourth Street, ST. LOUIS, MO.

We make a specialty of supplying cement works with

Chemical Apparatus, Chemicals and Reagents

Gilmore's Needles, Cement Moulds, Vicat Apparatus, Schumann's, LeChatelier's and Jackson's Specific Gravity Apparatus, Etc.

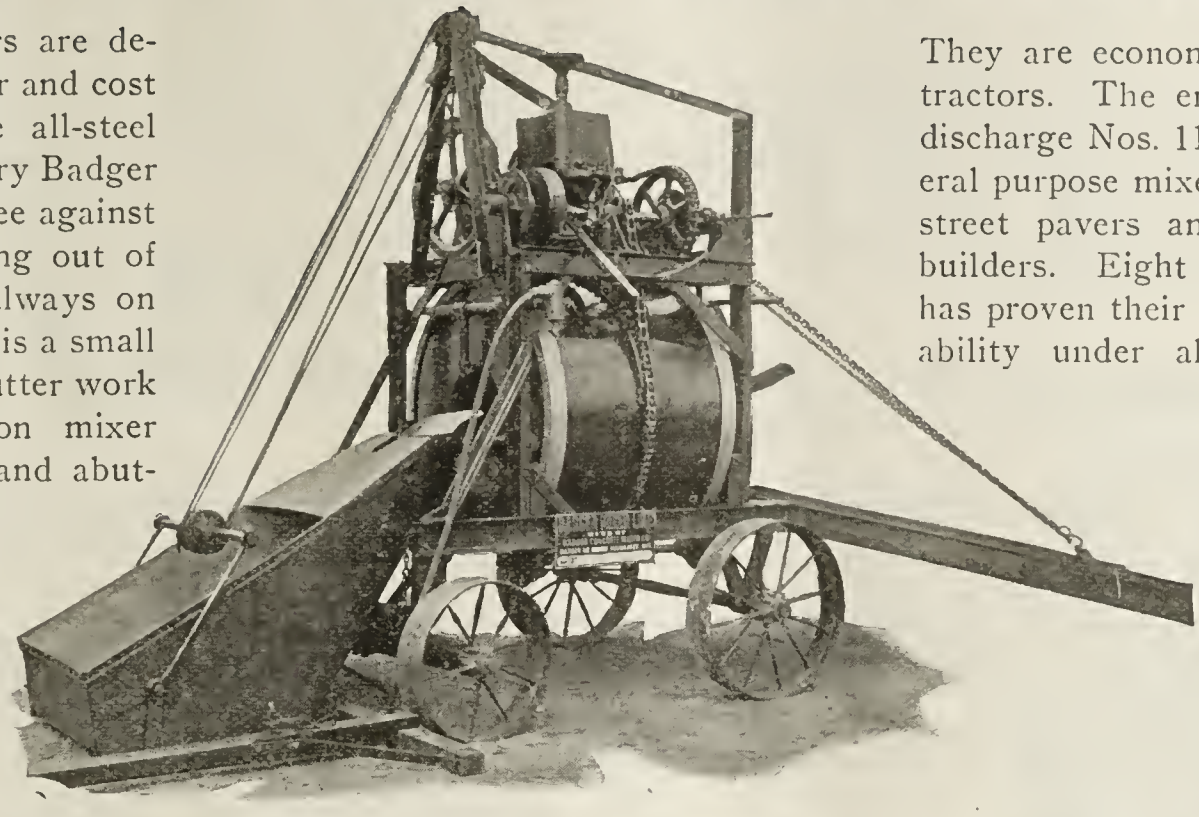
Pyrometers, Calorimeters

High Grade Goods Only

Satisfaction Guaranteed

BADGER MIXERS

The Badger Mixers are designed to save labor and cost of operation. The all-steel construction of every Badger Mixer is a guarantee against breakage or wearing out of parts. They are always on the job, whether it is a small mixer on curb or gutter work or the construction mixer upon foundations and abutments or the alley and street paver. Their light weight and durability has made a distinctive reputation for the Badger Mixer.



They are economical to the contractors. The end load and end discharge Nos. 11 and 15 are general purpose mixers and alley and street pavers and country road builders. Eight years of service has proven their absolute dependability under all conditions of concrete work.

Write for our attractive prices.

The ~ Badger ~ Mixer Line

BADGER CONCRETE MIXER CO., 13th Floor MAJESTIC BLDG. **MILWAUKEE, WIS.**

for facing concrete work

FOR the stucco suburban home—the modern public utility plant and factory—the bank and office building—first call is for Middlebury Terrazzo for facing concrete work.

Middlebury Terrazzo has all the appearance of solid marble—with all its advantages and at a material saving in price.

Made from Middlebury White and Crême Statuary Marbles, it is furnished, carefully graded to size, in either dust, No. 1, 2 or 3.

Send today for free samples and prices

Middlebury Marble Company

BRANDON, VERMONT

CLOSED—For Storing or Transporting.

ECONOMY STEEL SCAFFOLDING

is being used by a number of leading Chicago contractors, such as Thompson Starrett Co., R. C. Wieboldt, Blome Sinek, E. W. Sproul & Co., Math Rauen Co., Gerhardt Meyne and many others, who will gladly recommend them to every contractor as a good asset in equipment.

The illustration is of the Mason Horse 4 ft. 6 in. high and 5 ft. 0 in. wide which weighs but 60 lbs., they are sturdy in construction and their compactfulness when folded makes them very easy to handle, transport or store.

A TRIAL ORDER WILL CONVINCE YOU THAT THEY ARE A NECESSITY.

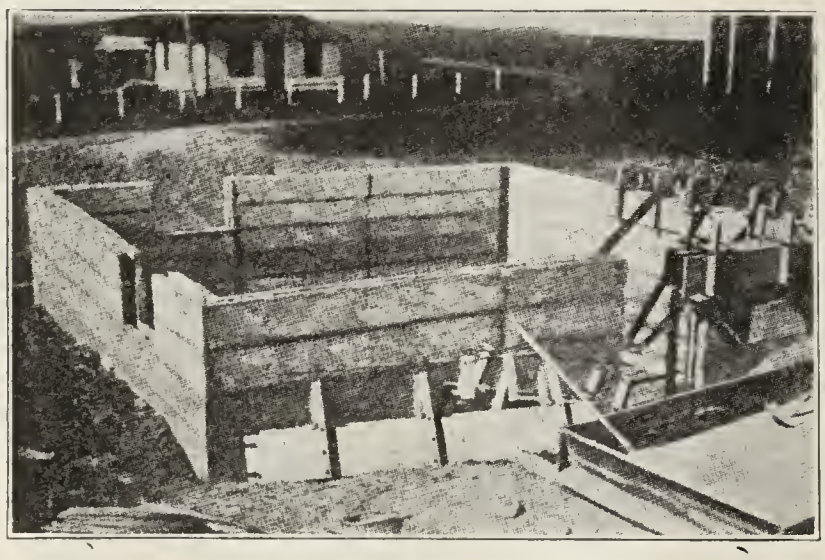
Price $6.00 each, F. O. B. Chicago.

ECONOMY SCAFFOLD CO.

4611-19 West Fulton St. **CHICAGO, ILL.**

FROST HOLLOW WALL FORMS

ADJUSTABLE TO ANY KIND OR SIZE OF BUILDING



With our forms you can build a double wall, reinforced concrete building to compete with the cost of frame construction.

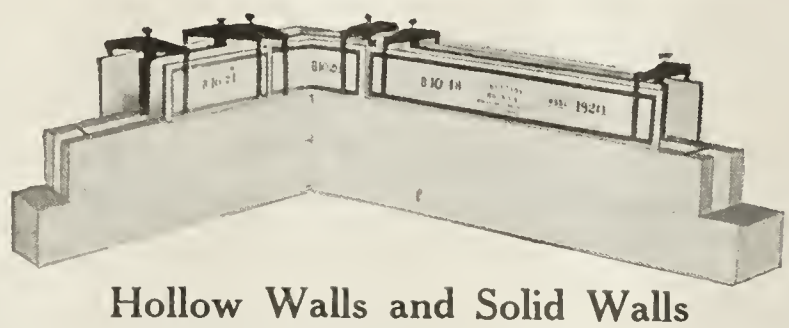
Moisture-proof, fire-proof, repair-proof walls. Save paint, lath, time and labor to you. Save repair, fuel and insurance to the owner.

Forms adaptable to any size building, adjustable to any thickness wall. Built of poured concrete, reinforced three ways with continuous dead air space makes the most desirable method of building construction. Simple to use, easily adjustable. No skilled labor required. Method has been tried and proven.

Write for complete description of method and its operation, photos showing work done, and costs.

HOLLOW CONCRETE WALL CO.

H. T. FROST, PRESIDENT MITCHELL, SOUTH DAKOTA



Hollow Walls and Solid Walls

These Forms build either kind. The Forms will owe you nothing after you have built the one job. **They are so Cheap.** They are strong and dependable forms and the lightest forms built. Don't break your back lifting forms from the wall. Let us prove these statements.

Send for our catalog

THOMPSON FORM & CLAMP CO.

Fond du Lac, Box 166 Wisconsin

CONCRETE SEPTIC TANKS

—an Independent Business

Install Sanitary Septic-Tanks. Every home outside of a sanitary sewer district needs it. A one-piece Tank Installed in Place; Self-Cleaning Vault. Large profits, quick returns. Every customer advertises the Septic Tank for you. Only a small investment required.

M. J. GRIFFITH, Inventor

Office 313 E. Tus. Ave. **Barberton, Ohio**

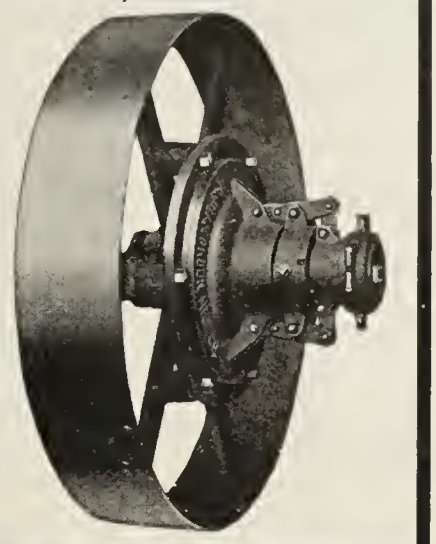
LITTLE DAILY LEAKS OF POWER BOOST YOUR COAL BILL

The High Cost of Power Is Reduced to a Minimum By the Use of a

Plamondon Disc Type Friction Clutch

The power of this clutch is unusual. The double toggles on this clutch develop such tremendous pressure that even on the largest clutches only a hand lever is needed to engage or disengage the clutch. The geared devices usually needed to operate large clutches are unnecessary.

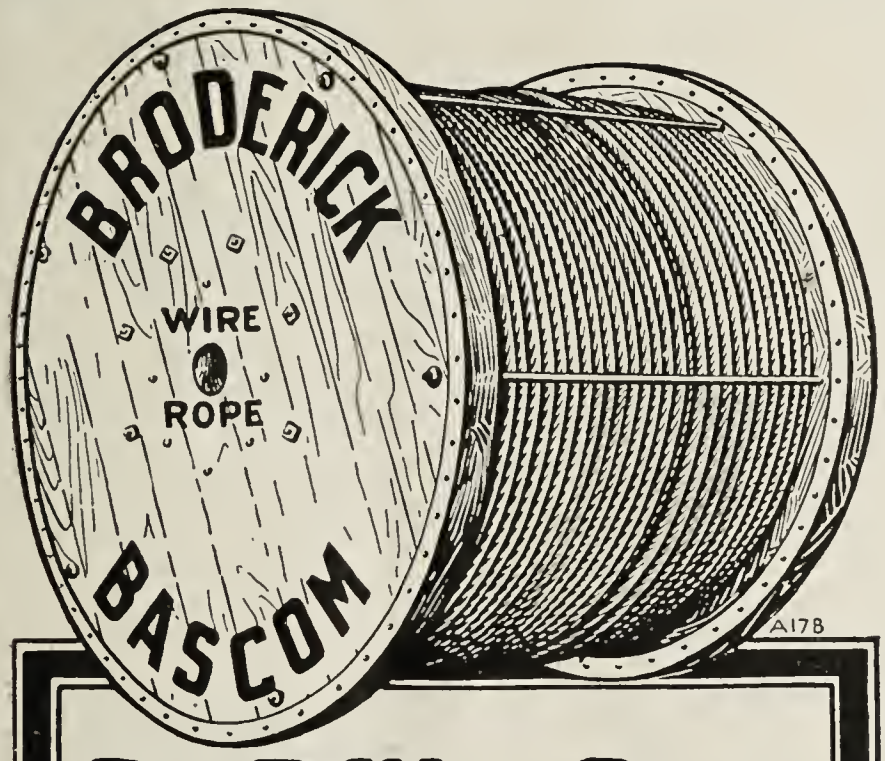
This is only one of the practical advantages the cement mills find in this clutch. Write for our new catalog No. 59 and learn the rest of them.



WE ALSO MANUFACTURE GEARS

A. Plamondon Mfg. Co.

5301 So. Western Blvd. CHICAGO, ILL.



B. & B. Wire Rope

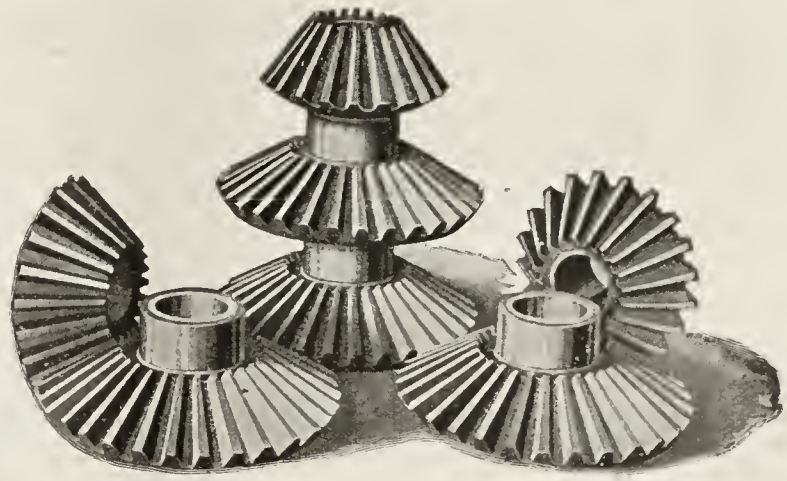
Measure B & B Wire Ropes against the requirements you demand in the best hoisting line. They're flexible, steel-strong, durable.

With those requirements successfully met, B. & B. Wire Ropes are bound to be dependable and economical. Write for Catalog 60

BRODERICK & BASCOM ROPE CO., St. Louis, Mo.

Manufacturers of Celebrated Yellow Strand and all standard grades of Wire Rope

Branches: New York and Seattle Factories: St. Louis and Seattle



Make Your Gear Service a Certainty

Ganschow Bevel Cut Gears—like Ganschow Gears of every kind—are cut with an accuracy and precision which makes smooth, easy, effective working a certainty. They minimize wear and tear and insure long life to the parts. From twenty to forty per cent less power is required to operate

Ganschow Cut Gears

as compared with cast gears, because of evenly-thick and evenly-spaced teeth, and because they are uniformly smooth. Throughout the whole machine the jar and strain are greatly reduced; and this means gear-efficiency from every standpoint.

As specialists in gear work, our splendid facilities enable us to take care of any requirement from the smallest gear up to 12 ft. in diameter—and do it QUICK. Every gear strictly according to specifications and free from defects.

How about YOUR gear requirements?

Wm. Ganschow Company, Chicago, Ill.

1003 W. Washington Street

INLAND

Steel Reinforcing Bars

Three grades: open hearth steel (new billet stock), "medium" and "hard" grade, and rail carbon steel (re-rolled). Both theory and practice agree on the design. Rounded corners prevent splitting of the concrete. Bending, fabricating and setting are easily done with these bars.

Sizes ⅜ to 1¼ inch. Lengths up to 85 feet. Shipments can be made promptly

Inland Steel Company
First National Bank Bldg. CHICAGO

WORKS:
Indiana Harbor, Ind., and Chicago Heights, Ill.

BRANCH OFFICES:
Dallas, Denver, Detroit, Los Angeles, Milwaukee, St. Louis, Kansas City, Mo., St. Paul, San Francisco, Seattle

Laclede Bars for Reinforcing Concrete

Many buyers now take advantage of facilities at mill by ordering bars cut to length, bent to shape, and tagged—ready for placing.

For Particulars Address

Laclede Steel Company

Works:
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East St. Louis, Ill.
Madison, Ill.

General Offices:
Arcade Bldg.
8th & Olive Sts.
ST. LOUIS

Chicago Office:
208 S. La Salle St.
Kansas City Office:
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IMMEDIATE DELIVERY

Franklin

ROUND—SQUARE—FLAT—SQUARE TWISTED

STEEL BARS
for CONCRETE REINFORCING

We can meet your Reinforcing Steel Requirements. This means not only quick shipment from the mills but co-operative service for rapid transportation. If you want to know just what your exact cost will be, send us the Blue Prints and we will give you a lump sum bid on all the steel sheared to lengths, bent to specifications and delivered to the job,

Our Engineering Department is at your service.

The FRANKLIN STEEL WORKS
FRANKLIN, PENNA.

Boston Office
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Philadelphia Office
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Cleveland Office
1320 Rockefeller Bldg.
Chicago Office
McCormick Bldg.

QUALITY SERVICE

Concrete Roads must be reinforced

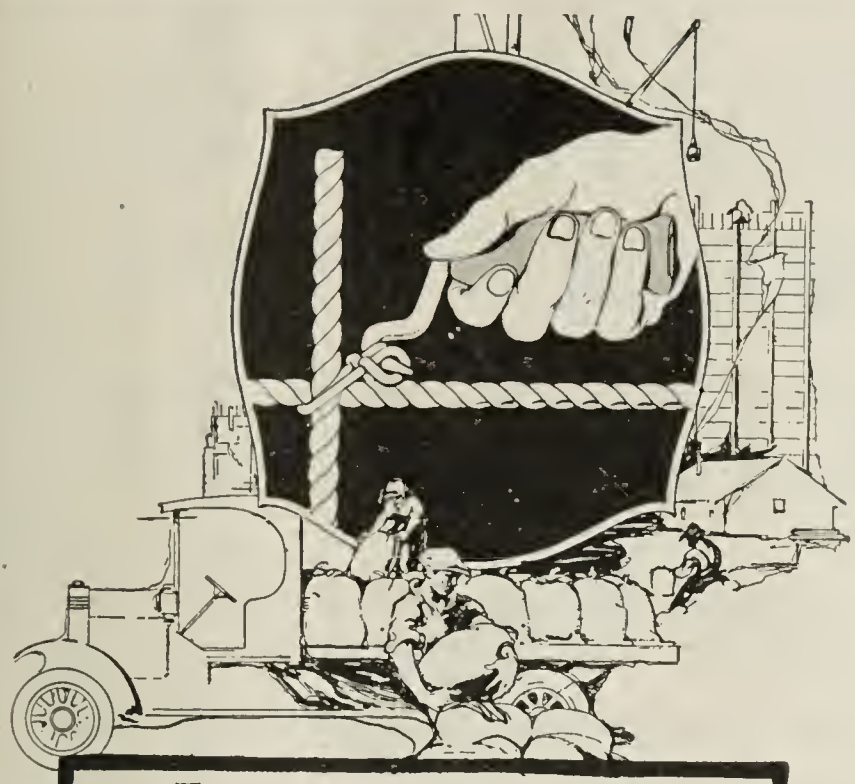
It is demonstrated beyond doubt that to make concrete roads proof against heavy motor traffic, weather and time, a fabric of steel must be incorporated in the concrete.

Several great states have so ruled.

American Steel & Wire Concrete Company's Reinforcements fulfills every engineering requirement.

Send for our book on road building.

Chicago
New York
Cleveland
Pittsburgh
Denver



Try the Bates Rod Tying System on your work FREE

Not until you have tried the Bates system of wire tying, can you realize the many advantages of this modern, superior method of rod tying.
You can speed up your tying and do it better and cheaper with the Bates system.

Send for this FREE Trial Bates Rod Tying Outfit

The Bates FREE Trial Rod Tying Outfit containing one "Simplex" Hand Tying Tool and 20 each of 4, 5, 6 and 7-inch Bates Wire Ties, will be sent on receipt of your signed agreement to try this Rod Tying Outfit on your work, and then, within fifteen days, send us $1.00 or return the tool. These trial ties cost you NOTHING.

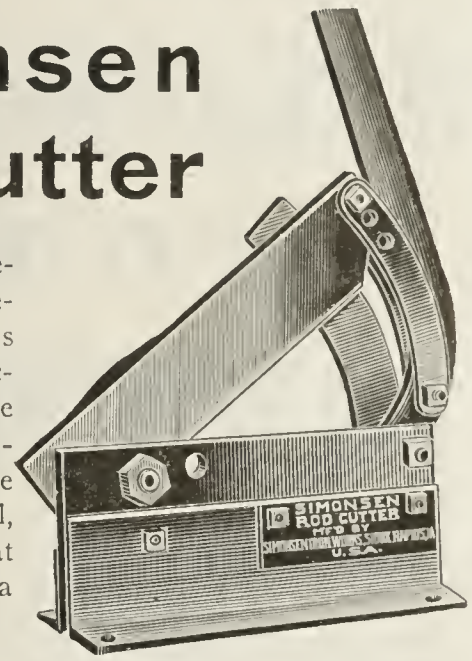
BATES VALVE BAG COMPANY

7330 South Chicago Ave., Chicago, Ill.

BATES SYSTEM FOR FILLING & CLOSING BAGS

110 Great Portland St., London, W. I., England

Simonsen Bar Cutter



Is designed especially to meet the requirements of builders in concrete construction needing a portable shear for cutting reinforcing bars on the job. It's a practical, low-priced shear that will pay for itself in a short time.

NON-BREAKABLE STEEL BODY

Cutting Jaws are of the "welded in" type, our own patented design. Lower or stationary jaw has a keen edge of hardened tool steel and is practically indestructible. Upper jaw does the actual cutting and is hinged at rear end on a heavy case hardened steel pin. It's reinforced.

Made in three sizes. No. 10 weight 75 lbs. Capacity ¾ in. round or ½ in. square twisted. No. 11 weight 125 lbs. Capacity 1 in. round or ¾ in. square twisted. No. 12, weight 175 lbs. Capacity 1¼ in. round or 1 in. square twisted. Shipped set up complete with suitable lever.

Ask your supply dealer or write us for full information.

SIMONSEN IRON WORKS, Manufacturers
Sioux Rapids **Iowa, U. S. A.**

Contractors can't afford to be without
The Waterloo Bar Bending Machine

It's made in 2 sizes, and is guaranteed to bend bars as follows: No. 2 bends cold reinforcing bars including 1⅛ in. round or square. Price $30.00. No. 3 bends cold reinforcing bars including 1¼-in. round or square. Price $35.00.

Bends bars to various angles desired. Has a detachable handle 7 feet long for convenience in handling.

Waterloo Construction Co., Waterloo, Iowa

SAVE CEMENT SACK LOSS

Bale your sacks up tight and right. Keep them baled up all the time If you have one of our handy sack balers you will do this. We manufacture a cleaner that cleans. Write us for prices and further information.

HANDY SACK BALER CO
620 S. 2d St.
CEDAR RAPIDS IA.

Leschen Wire Rope

There are many years of manufacturing experience back of every Leschen Wire Rope, which insure a product that is uniform and durable.

We make high grade Wire Rope for all purposes. If you will tell us how you use wire rope we shall be glad to suggest the correct rope for the work.

Illustrated catalog gladly sent upon request.

Established 1857

A. Leschen & Sons Rope Co.
ST. LOUIS, U. S. A.
New York Chicago Denver
San Francisco

For Better Concrete, Stronger Mortar—use HYDRATED LIME

Increases Concrete Density

By virtue of its ability to fill the voids, Hydrated Lime increases the density of concrete. The mass becomes more watertight—practically impervious to water. Honeycomb and other structural weakness are also prevented. Hydrated Lime promotes intimate contact of the concrete mass with the forms and produces smooth, pleasing exterior surfaces.

Other Reasons Why You Should Specify and Use Hydrated Lime

because

1. Makes the mixing of Portland cement concrete more easy, inasmuch as it lubricates the sand grains and coarse aggregates.
2. Renders the concrete mix plastic enough to flow freely and smoothly with a minimum of excess water.
3. Makes the concrete easier to work after it is deposited in the forms, thus eliminating labor usually required for spading and tamping against the forms.
4. Eliminates the tendency toward cracking, because it minimizes alternate expansion and contraction due to moisture changes.
5. Promotes uniformity of the mass concrete by producing a colloidal or jelly-like medium through which the rock and matrix do not segregate, thereby producing a stronger concrete.
6. Materially and directly increases the ultimate compressive strength and efficiency of the concrete, by virtue of its ability to hold water in mechanical suspension and thus supplying the necessary moisture required by Portland cement in order properly to set and attain its maximum strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

Ladd Lime & Stone Co., Cartersville, Ga.

Marblehead Lime Co., Chicago—Kansas City

Louisville Cement Co., Louisville, Ky.

Lee Lime Co., Lee, Mass.

White Marble Lime Co., Manistique, Mich.

Glencoe Lime & Cement Co., St. Louis, Mo.

Ste. Genevieve Lime Co., St. Louis, Mo.

Rockland&RockportLimeCorp. New York—Rockland, Maine—Boston

Hunkins-Willis Lime & Cement Co., St. Louis, Mo.

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

National Lime & Stone Co., Carey, Ohio

Ohio Hydrate & Supply Co., Woodville, Ohio

Woodville Lime Products Co., Toledo, Ohio

Merion Lime & Stone Co., Norristown, Pa.

American Lime & Stone Co., Tyrone, Pa.

Riverton Lime Co., Riverton, Va.

Vermarco Lime Co., West Rutland, Vt.

Western Lime & Cement Co., Milwaukee, Wis.

J. C. BUCKBEE COMPANY
ENGINEERS
BUILDERS OF CEMENT PLANTS

FIRST NATIONAL BANK BUILDING
CHICAGO, U. S. A.

THE FULLER ENGINEERING COMPANY
Designing, Constructing and Operating Engineers
Cement and Hydrated Lime Plants a Specialty

Reports, Examinations and Analyses of Raw Materials for Cement Consultations Solicited

Offices: Allentown National Bank Bldg.
ALLENTOWN, PA.

LIME KILNS HYDRATED LIME PLANTS PORTLAND CEMENT PLANTS
RICHARD K. MEADE & CO.
Chemical, Mechanical and Industrial Engineer
11 E. Fayette St., Baltimore, Md.
CEMENT TESTS CHEMICAL ANALYSES REPORTS ON MINERAL PROPERTIES

ROBERT W. HUNT JNO. J. CONE D. W. McNAUGHER
ROBERT W. HUNT & CO.
ENGINEERS

INSPECTION — TESTS — CONSULATION

CEMENT INSPECTION
INSPECTION OF REINFORCING STEEL AND ALL CONSTRUCTION MATERIALS.
Cement, Physical and Chemical Laboratories
NEW YORK CHICAGO PITTSBURGH
ST. LOUIS CINCINNATI KANSAS CITY SAN FRANCISCO
LONDON MONTREAL TORONTO VANCOUVER

THE KRITZER COMPANY
Designers, Engineers
and Manufacturers of
HYDRATING PLANTS
Hydrating Lime—The Kritzer Way
503 S. Jefferson St. Chicago, Ill.

Daniel B. Luten
INDIANAPOLIS
Designing and Consulting Engineer
Reinforced Concrete Bridges Exclusively
Associate Engineers in each State

BECAUSE WE SPECIALIZE ON
Lock Seam Pipe
with the smooth inside surface, having already furnished large quantities for Potash Recovery plants, we are able to give especially careful attention to the construction of this class of Pipe.
Robertson Bros. Mfg. Co., Chicago

PEERLESS ENGINEERING CO.
Layouts, specifications on Water Supply, Water Power, Suburban Electric Lighting and Power Plants, Designs for Oil or Gasoline Engines and Machinery, Industrial Buildings, Millwrighting, Supervision of Erection, Etc.
If you are or expect to use any kind of a HYDRAULIC RAM, write us for our free report, and will show you how to save big money.
P. O. Box 1472 Cincinnati, Ohio

C. A. P. TURNER
Mem. Am. Soc. C. E.
CONSULTING ENGINEER
Reinforced Concrete and Structural Steel Bridges, Buildings and Manufacturing Plants
627 1st Ave., N. MINNEAPOLIS, MINN.

POSITION WANTED

By Graduate Chemist. Experience in Cement Industry, Chief Chemist, and Construction Work. Also sales experience in allied line. Would consider position in either Operating or Sales Departments. Address Box 47, c/o Cement & Engineering News, 22 Quincy St., Chicago, Ill.

POSITION WANTED

By competent Cement man as Superintendent, Chief Chemist or Draftsman, 9 years experience. Address Box M, c/o Cement & Engineering News, 22 Quincy St., Chicago.

WANTED

Chief Chemist for small dry process plant located south. Address reference, stating salary. Box M. M. 66, c/o Cement & Engineering News, 22 Quincy St., Chicago.

Practical Cement Manufacturer, 30 years' experience, open to promote and assist in financing meritorious Portland Cement enterprises. Have promoted and financed and erected five cement plants. Give full particulars, location, raw materials and markets available. Would consider management of cement plant. Cement Manufacturer, c/o Cement & Engineering News, 22 Quincy St., Chicago, Ill.

POSITION WANTED

Mechanical Engineer, technical, experience in the design, construction and operation of cement mills. Address Box 93, care of Cement & Engineering News, 22 Quincy St., Chicago.

POSITION WANTED

Mechanical Engineer, 35 years old, 12 years' experience in Cement Plants, desires position as Chief Draftsman, Engineer, or Assistant to Superintendent. Address Box 84, c/o Cement & Engineering News, 22 Quincy St., Chicago, Ill.

GREGORY ELECTRIC CO.

16TH AND LINCOLN STS. CHICAGO, ILL.

AMERICA'S MARKET FOR

USED ELECTRICAL MACHINERY

FOR SALE OR RENT

Some people will buy only new electric motors, paying the highest prices without questioning. But aren't you willing to spend two cents to find out whether you can get a used motor of that same type from us for much less? If the motor is of good design won't it do your work just as well if bought from us—as though bought new?

H.P.		220 Volt D. C.	Speed
1	50	Westinghouse	750
3	50	Crocker-Wheeler	625
1	50	Northern	550
2	50	Westinghouse	525
1	50	Westinghouse	450
1	60	General Electric	800
1	60	Northern	650
1	75	Westinghouse	850
1	75	Burke	375
1	90	Western Electric	525
1	90	Northern	450
1	100	Allis-Chalmers	850

H.P.		3 Phase, 60 Cycles	Speed
2	60	Western Electric	900
1	75	Gen. Elec.	1800
1	75	Gen. Electric, slip-ring.	900
2	100	Gen. Elec.	1800
2	250	Gen. Elec., 550-volt	490
6	150	Gen. Elec., slip ring	600

Every machine sold is overhauled "like new"

MOTORS AND GENERATORS

$100,000 stock to pick from at bargain prices.

Satisfy yourself, write, wire or phone us. Our repair shop most up to date.

Motors AC and DC
Generators
Motor Generator Sets
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CHICAGO ELECTRIC COMPANY

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ELECTRIC REPAIRS

of all kinds. All sizes of motors on hand.

We send our expert mechanics or electrical engineers to any part of the country.

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Residence Phone: Oak Park 5005

FOR SALE

One New
RANSOME MIXER
1 Yard Capacity, Electric Drive

One Yard
ORANGE PEEL BUCKET

Several Tip-over and Bottom Dump Buckets, also some small construction equipment.

WISCONSIN-MINNESOTA LIGHT & POWER COMPANY

EAU CLAIRE, WIS.

FOR SALE

Completely equipped Sand and Gravel Washing Plant. Unlimited supply of material. Capacity of plant 50 cu. yds. per hr. 165 miles paved road to be built within two years within a radius of 60 miles. Only plant in territory. Other business interests reason for selling. This is a money maker. Address Box 17, care Cement & Engineering News, 22 Quincy St., Chicago, Ill.

Crushing Plant
$5750.

1—No. 5 Gates Gyratory, reg. drive.
2—No. 6 Gates Gyratory, reg. drive.
1—No. 6 Gates L. H. drive.
1—Revolving Screen, 48 in. x 22 ft.
1—72 x 18 H. R. T. Boiler, 115 lb.
1—14 x 24 Horizontal steam engine.
1—Pump 1 Feed water heater, all belting, shafting, pulleys and 2 overhead hoists.

Also

15—40 in. gauge, 2-yard, all steel, special built end. dump cars, $200 each.

Also

LOCOMOTIVES, CARS, RAILS, SHOVELS, CRANES, Etc.

FRANCIS E. B. O'BRIEN
41 South 15th Street, Philadelphia, Pa.
Phone Spruce 2262 Race 3513

Air Compressors

2—710 C.F.M. Class WJ3 Sullivan Angle-Compound Belt Driven Air Compressors. Practically good as new. Immediate shipment.

A. McMILLAN
628 Monadnock Block CHICAGO, ILL.

FOR SALE

2 Gasoline Locomotives, Model E, 7½ ton, engine 6"x7" P. O. M. 15233, 36" gauge, George D. Whitcomb Company, manufacturer.

Sales Department,
CHARLESTON INDUSTRIAL CORPORATION
NITRO, WEST VIRGINIA
Operating the City of Nitro

FOR SALE

CRUSHERS

1—No. 4 and 1—No. 6 Allis Chalmers Gyratory. First Class Shape.

HOISTS

3—8¼x10 Lidgerwood D. C., S. D. Heavy Duty.

Dump Cars, Locomotives, Rails.

Mid-Continent Equipment & Machinery Co.
Security Bldg., St. Louis, Mo.

Contractors' Equipment
From the $87,000,000 Old Hickory Plant

4 7x10 D.D. Hoists, with Boilers.
1 7x12 D.D. Hoists, with Boilers.
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8 6 H.P. Stover Gasoline Engines.
3 10 H.P. Novo Vertical Gas Engines.
1 3 H.P. F. M. Type 2.
1 5 H.P. F. M. Type 2.
1 15 H.P. Lambert Horizontal.
60 Diaphragm Pumps, all sizes, Hand and Power Driven.
6 Compressors.
11 Windlasses.
15 Winches.
7 Clam Shell and Drag Line Buckets.
5 Bottom Dump Cement Buckets.
3 Jeffrey Loaders.
Mixers, Steam and Gasoline Driven Wheelbarrows.
Concrete Buggies.
2000 tons 67½ lb. Rail, Russian Section.
2000 tons 80 lb. Rail, A.S.C.E. Section.
1000 tons 25 lb. Rail.
3 2-6-0 Locomotives.
36 Storage Battery Locomotives, 36-in. gauge.
5 Dinky Engines.
10000 Steel Cots, single and double deck.
30000 Mattresses, single and three-quarters.
New and second hand Tools, all kinds.
Thousands of other articles.

Wire or write for complete lists; our prices are lowest.

Nashville Industrial Corporation
Jacksonville, Tenn.

WANTED

Revolving Steel Cylinder about 20′ to 30′. Write details and price.

E. B. Leaf Co., 50 Church St., New York

TANKS FOR SALE

NEW AND USED, IN ALL PARTS OF THE COUNTRY

Over 4,000 steel storage tanks
" 2,000 wood tanks
" 500 tanks with agitators, jackets, etc.
" 1,800 rectangular tanks
" 1,500 glass enameled tanks
" 1,200 steel pressure tanks
" 15 tanks and towers

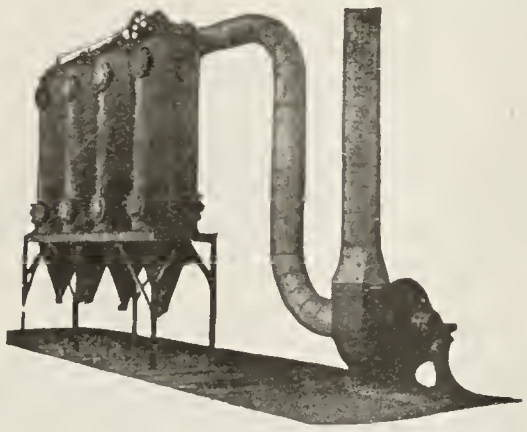
We make lowest prices on new tanks of any character or kind anywhere.

Chemical and Mechanical Equipment

Largest dealers in tanks

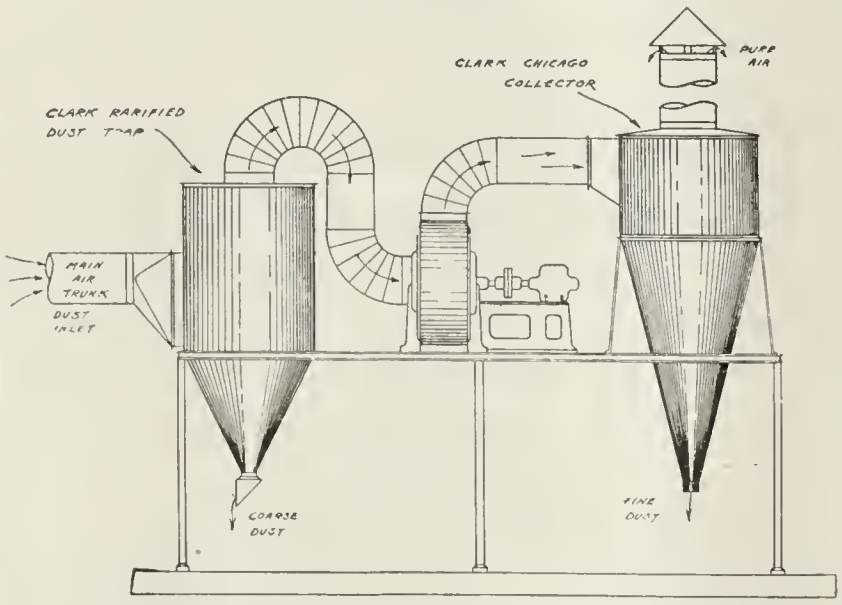
THE CURTISS-WILLIS CO.
30 Church St., New York

NORBLO
SUCTION FILTER



The NORBLO Suction Filter is installed in batteries of cylinders from two up to any number which may be required. Each cylinder has twelve closely woven cloth bags which strain the dust laden air, making escape of any material impossible. Air and dust is drawn into bottom hopper of machine and strained through the bags, the clean air passing out of the manifold at the top, thence to the fan. Fan always handles pure, clear air, free from all impurities. **More material can be recovered with this equipment than with any other known medium.**

OUR ALL METAL SYSTEM



The Clark All Metal System consists of Clark Chicago Collector, Fan and Adjustable Air Separator. This system can be used for the collection of dust of any kind. Occupies minimum space. Durable and efficient. The Clark Adjustable Air Separator insures longer life to the fan by separating the abrasive dust ahead of the fan, making two classifications of dust collected.

All Metal Systems reduce your fire and explosion hazards, insure longer life to your machinery and a better day's work from your employees.

Write us if you are interested in Pneumatic Conveying or Dust Recovery Problems

CLARK DUST COLLECTING CO.

Dust Collecting Engineers

Fisher Bldg., Chicago, Ill.

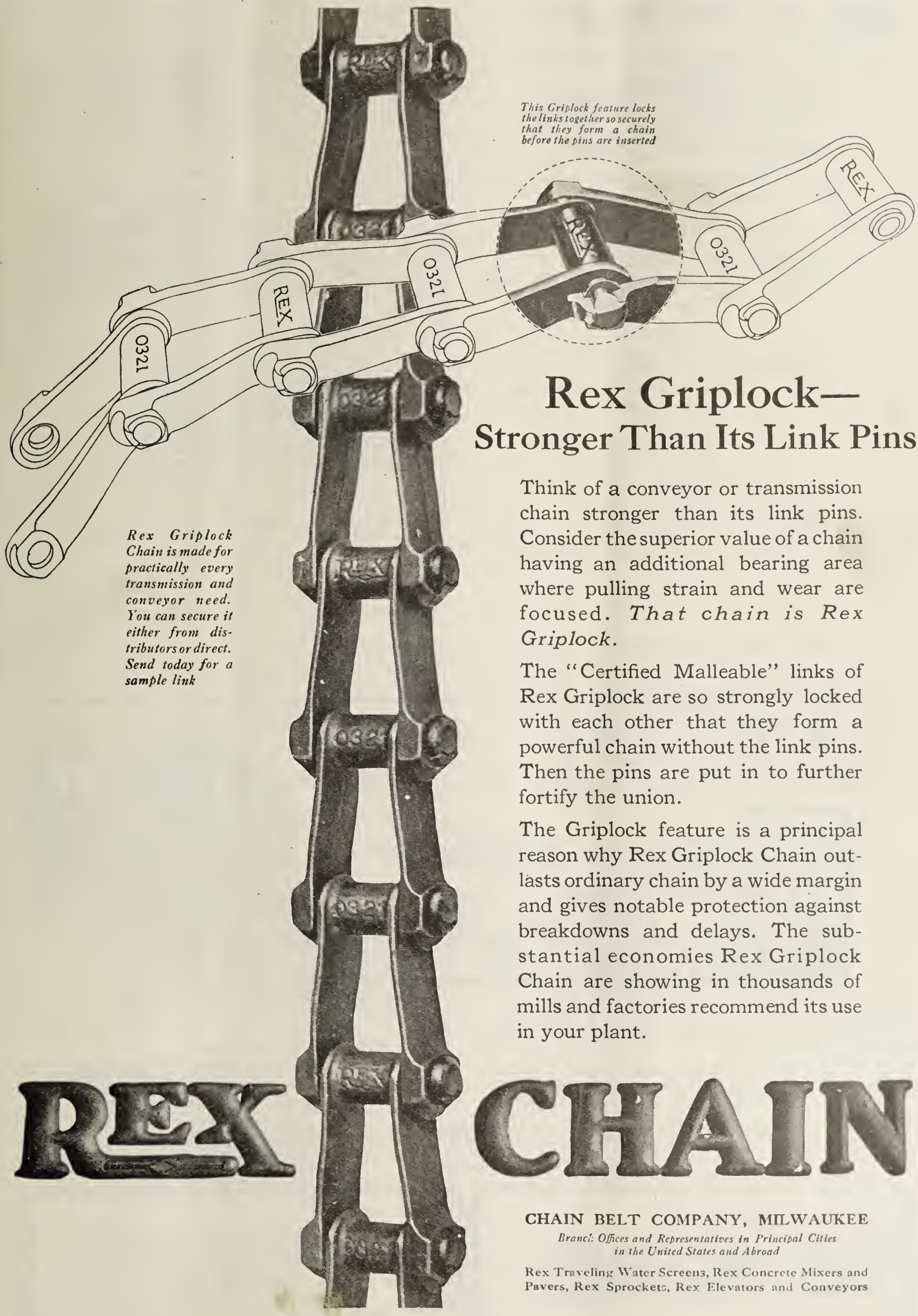
A Dust Collector Which Pays for Itself

By purifying the air which the men breathe in this plant, thus increasing their efficiency, and by salvaging the dust removed from the air, this Allis-Chalmers Dust Collector has paid for itself in a very short while. This device is installed in Hillsville, Pa., plant of the Carbon Lime Stone Company.

To collect the dust and keep itself in "collecting condition"—that is the problem solved by the A. C. Style B Dust Collector.

Ask for Bulletin 1454-O

ALLIS-CHALMERS
MILWAUKEE, WIS. U.S.A.



This Griplock feature locks the links together so securely that they form a chain before the pins are inserted

Rex Griplock Chain is made for practically every transmission and conveyor need. You can secure it either from distributors or direct. Send today for a sample link

Rex Griplock—
Stronger Than Its Link Pins

Think of a conveyor or transmission chain stronger than its link pins. Consider the superior value of a chain having an additional bearing area where pulling strain and wear are focused. *That chain is Rex Griplock.*

The "Certified Malleable" links of Rex Griplock are so strongly locked with each other that they form a powerful chain without the link pins. Then the pins are put in to further fortify the union.

The Griplock feature is a principal reason why Rex Griplock Chain outlasts ordinary chain by a wide margin and gives notable protection against breakdowns and delays. The substantial economies Rex Griplock Chain are showing in thousands of mills and factories recommend its use in your plant.

REX CHAIN

CHAIN BELT COMPANY, MILWAUKEE

Branch Offices and Representatives in Principal Cities in the United States and Abroad

Rex Traveling Water Screens, Rex Concrete Mixers and Pavers, Rex Sprockets, Rex Elevators and Conveyors

CEMENT AND ENGINEERING NEWS

with which Gravel & Stone Magazine is Incorporated

22 Quincy Street, Chicago.

(PUBLISHED MONTHLY)

William Seafert, *Publisher and Editor*

J. F. Waldron, *Advertising Manager*

R. M. McCully, *Business Manager*

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United States, Canada, Philippine Islands and Mexico, $1.00 per year; all other countries, $1.50 per year.

Single Copies 20c.

SUBSCRIPTION RENEWALS

Send in your remittance for renewal promptly. Your name will be dropped from our mailing list after second notification.

Advertising copy or changes in ads. must be in this office by the 25th of each month, as hereafter our magazine will appear on the 5th of the following month

Advertising Rates Sent on Application

Vol. 33 CHICAGO, October, 1921 No. 10

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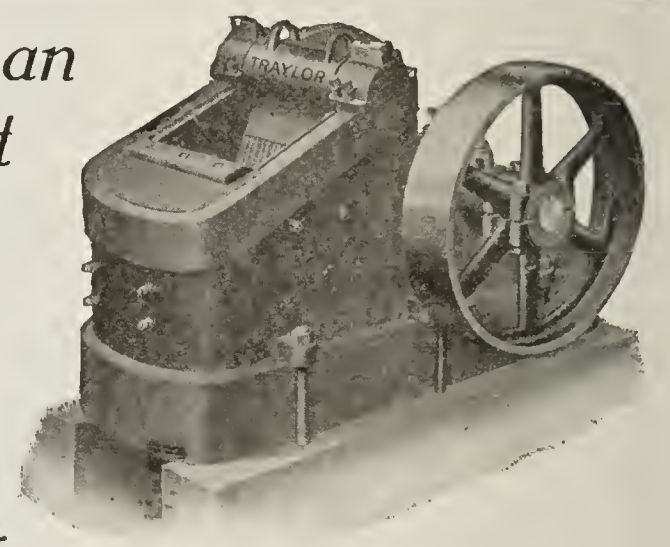
Traylor "Bulldog" Jaw Crushers Mean a Saving at Any Crushed Stone Plant



One method of designing crushers is to make them so massive throughout that it is practically impossible for them to be subjected to strain. Yes, they crush but the cost of operation is terrific.

Traylor Engineers strove to design the lightest yet the strongest crusher possible, that's why the frame of every "Bulldog" Jaw Crusher has a steel band shrunk on it top and bottom and all are equipped with the "Bulldog" Toggle system, the pitman of which is by far the lightest yet strongest of its kind being; made of wrought-steel tension members.

And it's this fine balance of weight and strength that makes the "Bulldog" crusher so economical to the user. Ask your neighbors about the power costs of their "Bulldog" Crushers.

TRAYLOR ENGINEERING & MFG. COMPANY, Allentown, Pa.

New York *Chicago* *Pittsburgh* *Los Angeles* *Spokane*

Truck and Tractor Division, Cornwells, Bucks Co., Pa.

For Immediate Delivery

10 in. x 20 in. Type "A" Jaw Crusher
14 in. "Bulldog" Gyratory Crusher
No. 7½ Gyratory Crusher
36 in. x 16 in. Type "A" Crushing Roll

And the Same Economy That's Found in Traylor "Bulldog" Crushers is Built in Traylor Motor Trucks and All Purpose Tractors

VULCAN INDUSTRIAL LOCOMOTIVES
and leading Industrial Concerns

The Cement Industries

These Vulcan Locomotives are only representative of the many built for the cement industries located in every cement manufacturing state in the United States and Canada.

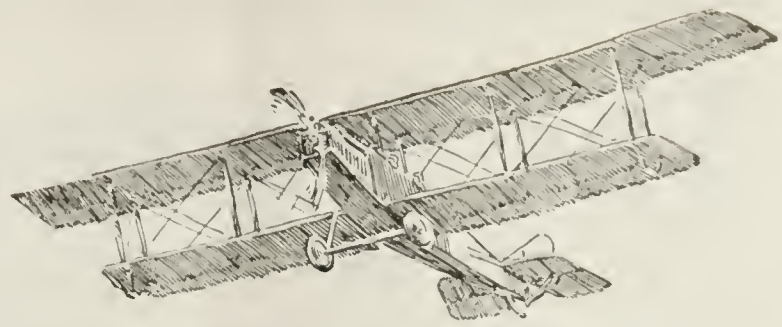
Vulcan Locomotives are also used by cement plants in foreign countries from Cuba to Japan. Of the many cement companies now in the United States more than half are equipped with Vulcan cement machinery.

No matter where your plant may be situated or what your peculiar requirements may be, Vulcan's wide experience is capable of producing the best for your requirements.

Vulcan Iron Works

Established 1849

1740 Main Street Wilkes-Barre, Pa.



Service

LUTZ STONE COMPANY
ESTABLISHED 1867
DIMENSION, BUILDING AND
CRUSHED STONE
OSHKOSH, WIS

July 18th, 1921.

Allis-Chalmers Mfg. Co.
Milwaukee, Wisconsin.

Gentlemen:

I write this letter to compliment you on the extra-ordinary service rendered in delivering the pinion gear to the Gilles Meisenheimer Flying Field in response to my telephone call.

After talking with you I took it for granted that I had plenty of time regardless of the fact that I had eighty miles to go against your seven. However it took about half hour to fill the gas tank which happened to be empty and due to the fact that the wind was directly from the south it took almost an hour to make the flight. Immediately upon landing I made inquiry and found that the part had arrived long since. Strapped it to the side, hurried back and had the plant running shortly after lunch.

Kindly accept our thanks for the service which I assure you was sincerely appreciated.

Yours very truly,
Richard W. Lutz
Lutz Stone Company

RWL.1

Repair Service—

A telephone call was received at 8:30 one morning from the Lutz Stone Company, Oshkosh, regarding repairs for their No. 5 "K" Crusher. The parts being in stock, we were surprised at Mr. Lutz's statement that he would call for them in an hour, Oshkosh being three (3) hours distance by train. The parts were delivered as requested at the Milwaukee Air Port, seven miles from our plant within forty-five minutes after the call. Mr. Lutz called for them in his aeroplane and upon reaching home was enabled to have his plant in operation shortly after noon.

Allis-Chalmers Service is at your command.

ALLIS-CHALMERS MANUFACTURING COMPANY

MILWAUKEE, WISCONSIN. U.S.A.

The Bradley Hercules Mill

Built for the Preliminary Pulverizing of Cement Materials

In Operation at the Largest and Most Successful Cement Plants Since 1913 —More Popular Than Ever and More Successful

13 Mills Sold to Pennsylvania Manufacturers
Other Installations in Tennessee—New York—North Carolina—
Illinois—Oklahoma—California—Washington—Cuba—Argentine

It's the largest preliminary machine manufactured adapted for pulverizing Cement Rock, Limestone or Clinker.

One manufacturer with two mills ground 170,000 barrels Clinker in one month—another manufacturer has averaged 40 tons per hour, when grinding Limestone over a period of several years of operation.

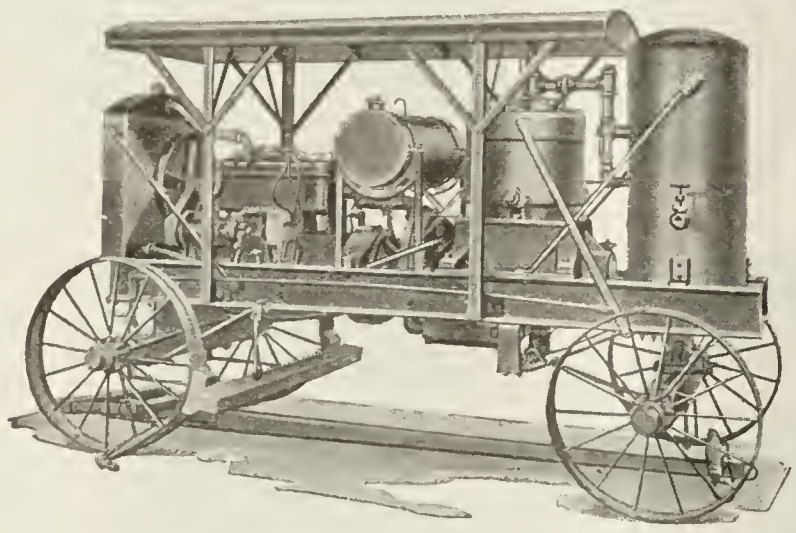
It's a Wonderful Labor and Power Saver

Our Engineers will gladly show you how this mill will reduce your present operating costs, using your present tube mill equipment, and increase your output.

BRADLEY PULVERIZER COMPANY

Works: Allentown, Pa. **BOSTON, MASS.**

Manufacturers of Pulverizing Machinery for 30 Years



Cut the cost of removing your rock in road and street work

A Sullivan Portable Air Compressor, plus a Rotator or two, forms an independent power drilling plant which will quickly save its cost on your contract in reduced labor, time and power.

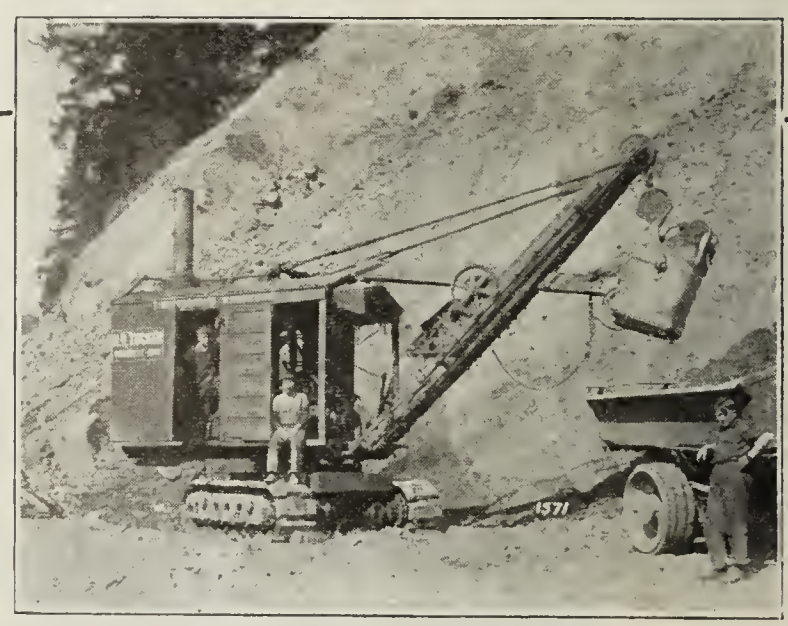
The two-cylinder, gasoline engine-driven vertical compressor is equipped with "wafer" valves, automatic unloader and force feed lubrication. Its rating is 150 ft. of free air against 100 lbs., 28 H. P.

The Engine is a four-cylinder, heavy-duty tractor type, with high-grade automobile carburetor, ignition and magneto. All mounted on a steel truck, with air receiver, gasoline tank and radiator.

Ask for Bulletin 1775-T

SULLIVAN MACHINERY COMPANY

418 PEOPLES GAS BLDG.



When investing your money you will do better with

OSGOOD

QUALITY—SERVICE

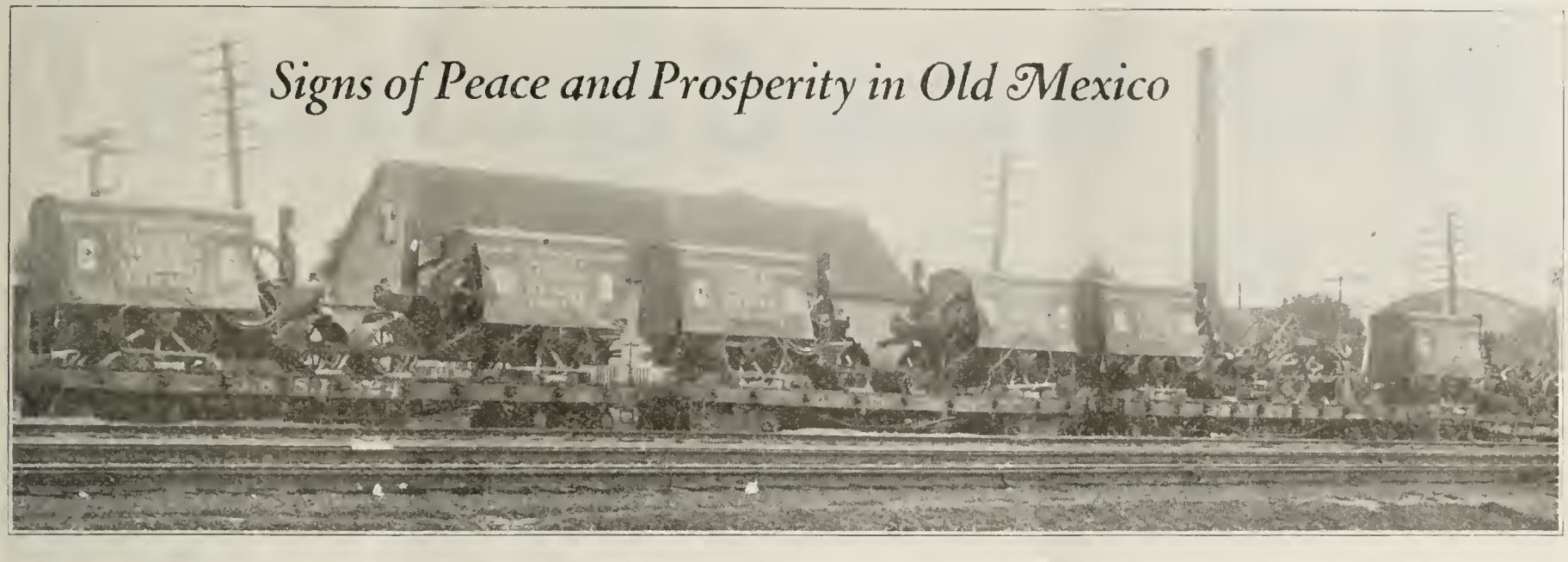
Investigate their superior features now.

WRITE, PHONE OR WIRE.

Revolving Steam Shovels ¾ and 1 yard.
Railroad Type Steam Shovels 1½-6 cu. yards.

THE OSGOOD COMPANY, MARION, OHIO., U.S.A.

Signs of Peace and Prosperity in Old Mexico



Trainload of Austin Motor Rollers and Road Machinery Sold to the Mexican Government

To be used successfully in the out-of-the way corners of the world, road building equipment must be absolutely dependable; first, last and all the time.

Austin Machinery can be found in most of these corners, giving the same lasting service and satisfaction that distinguish it at home.

Austin Manufacturing Co.

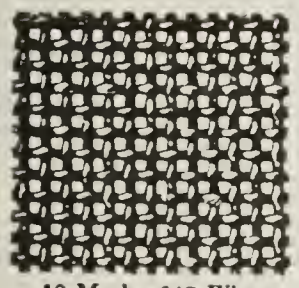
New York **Chicago** **San Francisco**

Canadian Agents: Canadian Fairbanks-Morse Co., Ltd., Winnipeg, Calgary, Saskatoon.

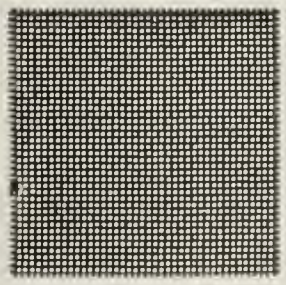
EXPORT DEPARTMENT
ALLIED MACHINERY COMPANY OF AMERICA
51 Chambers St. New York U.S.A. Cables Almacoa New York

Cleveland Double Crimped
WIRE CLOTH

2½ Mesh; .105 Wire



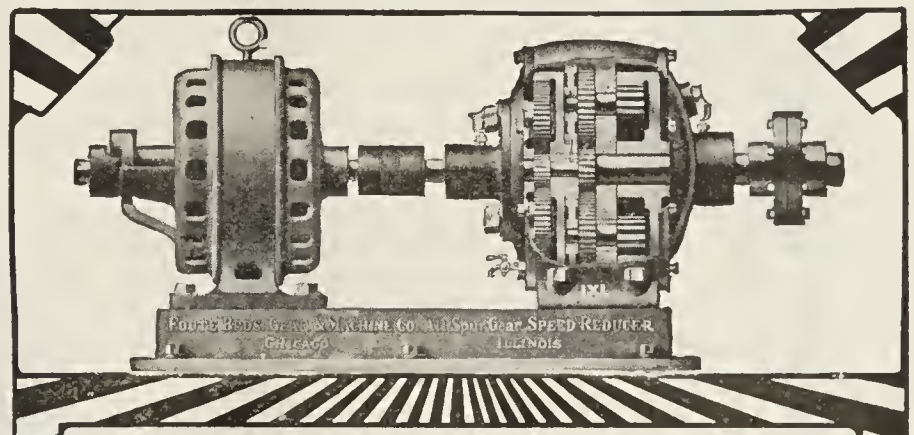
12 Mesh; .047 Wire



40 Mesh, .0135 Wire

You should use our screens because a uniform fineness of screened product is assured by an even, accurate mesh. This is a characteristic of "Cleveland" Double Crimped Wire Cloth.
Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

The Cleveland Wire Cloth & Mfg. Co.
3579 E. 78th Street, CLEVELAND, OHIO



FOOTE SPEED TRANSFORMERS

Write to us, state the conditions that exist in your plant, and get the advice of our engineering department.

FOOTE BROS. GEAR & MACHINE CO.,
228-238 N. Curtis St. Chicago, Ill.

For FIRE BRICK and DUST
Specify
CRESCENT QUALITY
THE UTMOST IN
FIRE CLAYS

CRESCENT REFRACTORIES CO.
Curwensville, Clearfield Co., Pa.

NO headaches!

EVERY user of explosives knows that the handling of explosives and the breathing of fumes are followed by a "Powder Headache"—a headache that MUST be endured whenever certain kinds of dynamite explosives are used.

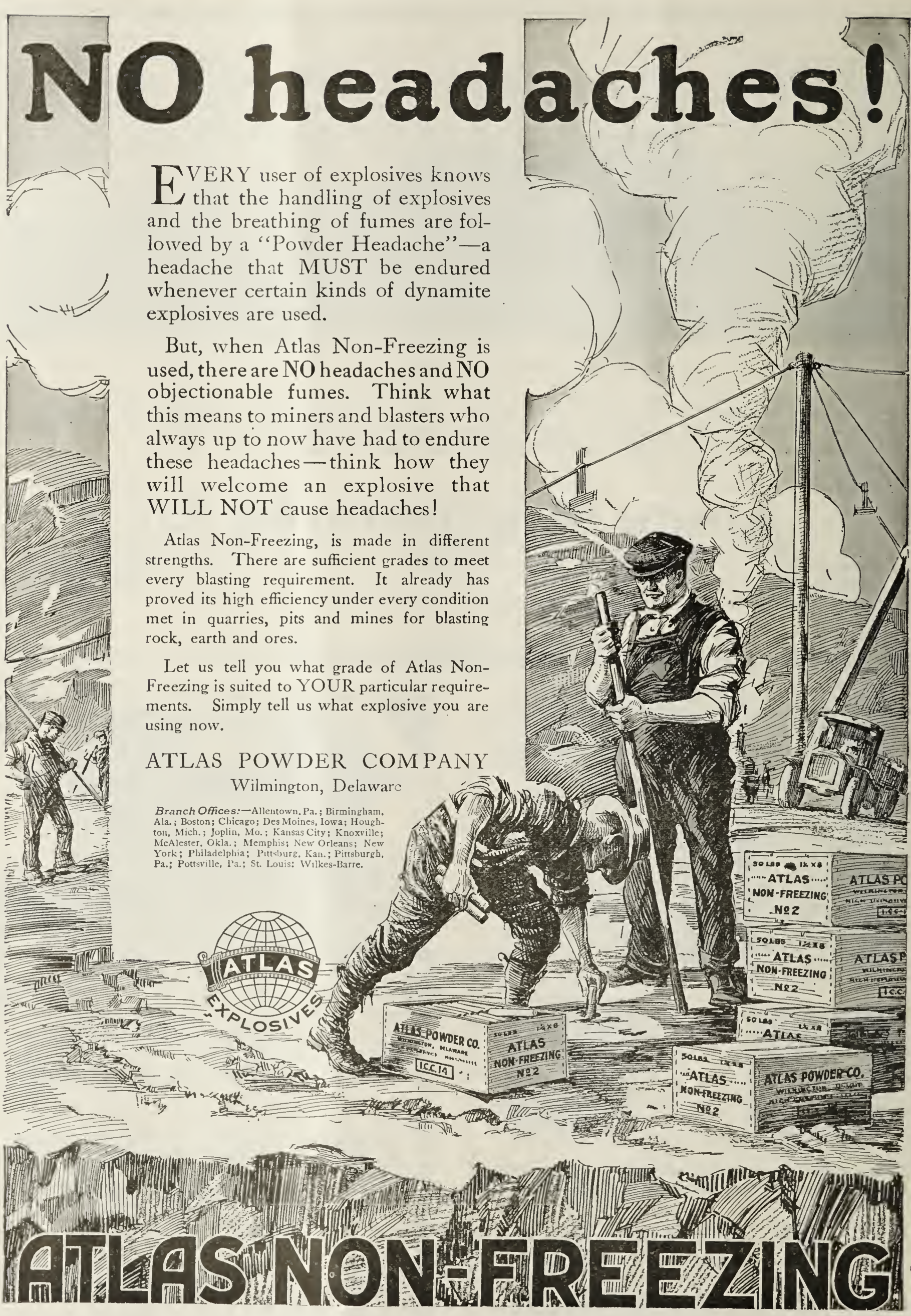
But, when Atlas Non-Freezing is used, there are NO headaches and NO objectionable fumes. Think what this means to miners and blasters who always up to now have had to endure these headaches—think how they will welcome an explosive that WILL NOT cause headaches!

Atlas Non-Freezing, is made in different strengths. There are sufficient grades to meet every blasting requirement. It already has proved its high efficiency under every condition met in quarries, pits and mines for blasting rock, earth and ores.

Let us tell you what grade of Atlas Non-Freezing is suited to YOUR particular requirements. Simply tell us what explosive you are using now.

ATLAS POWDER COMPANY
Wilmington, Delaware

Branch Offices:—Allentown, Pa.; Birmingham, Ala.; Boston; Chicago; Des Moines, Iowa; Houghton, Mich.; Joplin, Mo.; Kansas City; Knoxville; McAlester, Okla.; Memphis; New Orleans; New York; Philadelphia; Pittsburg, Kan.; Pittsburgh, Pa.; Pottsville, Pa.; St. Louis; Wilkes-Barre.



ATLAS NON-FREEZING

FABRICATED STEEL PRODUCTS

We specialize on FABRICATED STEEL PRODUCTS and are equipped to furnish steel plate products such as Tanks, Hoppers, Stacks, Conveyors, Chutes, Pipe, Elevator Legs, Coal Mine Equipment, Cement and Concrete Sheet Steel Forms promptly. Let us estimate on your requirements.

CORRUGATED SHEETS ERECTED

We are specialists in furnishing and erecting ROOFING and SIDING of Galvanized, Painted or Zinc sheets, corrugated or formed. Our mechanics are experts—they know how. Let us figure on your erection, no matter where located.

Our complete stock of Galvanized, Black, Blue Annealed Sheet Steel and Zinc enable us to give immediate attention to all orders and inquiries received

THE SYKES COMPANY

930 West 19th Place **CHICAGO, ILL.**

QUALITY OF TAYLOR MESABA STEAM SHOVEL CHAIN IS SHOWN BY ITS SERVICE RECORD

TAYLOR MESABA

A large number of contractors and cement, lime, crushed stone and sand and gravel producers—both large and small—have found from actual experience that the dependable service always obtained from Taylor Mesaba Steam Shovel Chain enables them to keep their output up and their operating expense down.

Taylor Steam Shovel Chain is a product of many years of practical chain making.

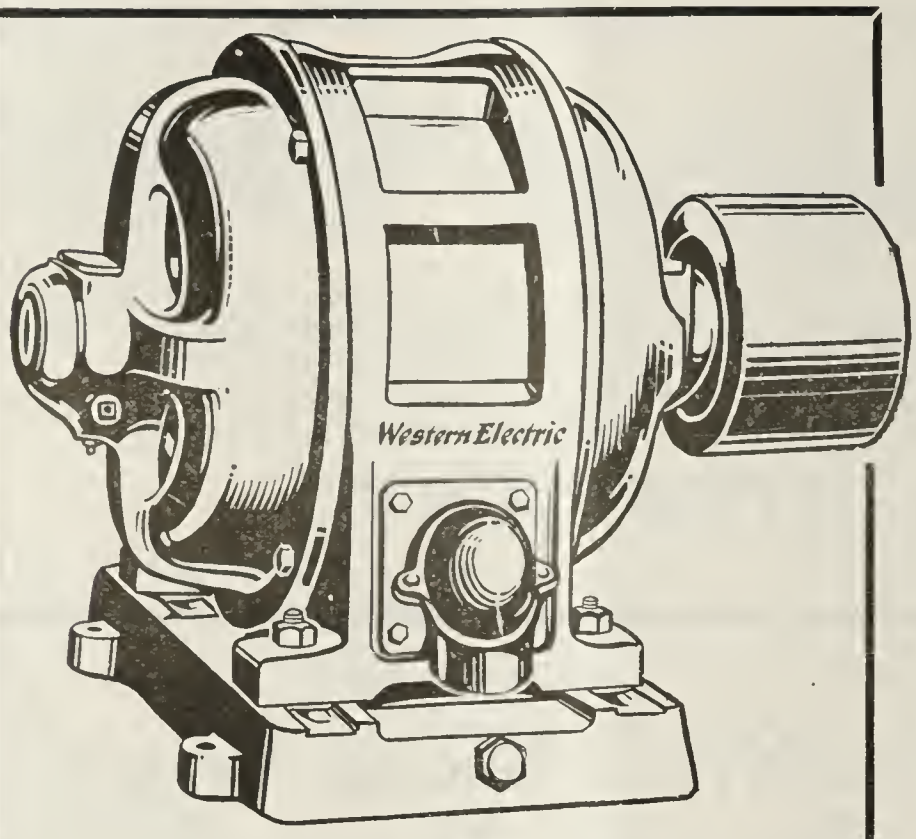
Every individual link is correct in size and shape, smooth finish, swedged to long taper, welded on end, with length of weld not less than twice the diameter of the iron.

These details are watched by master workmen, whose life work is the making of good chain.

Sizes carried in stock—¾", ⅞", 1", 1⅛", 1¼", 1⅜", 1½", and 1⅝". When you need chain for strain, order Taylor Mesaba.

S. G. TAYLOR CHAIN CO.

144 SO. DEARBORN ST. CHICAGO



DID YOU EVER STOP TO CONSIDER

That we have spent years of our time on your electrical problems? Years of untiring efforts which embraced university training, laboratory tests on material, plant analysis, etc? We offer you today the services of men from our organization who can carry your problems through to a successful issue, can meet your emergency just the same as we met others.

We are specialists in Motor Designing, Motor Building, Coil Building and Power Surveys. The knowledge we have gleaned after making a thorough study of cement mill plants and their operation, the experience we have gained through making the cement industry our choice of operations and our factory facilities we offer you now. We know we can be of aid to you and we also know you have your electrical problems to solve.

An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States.

Lansing Electric Engineering Co.

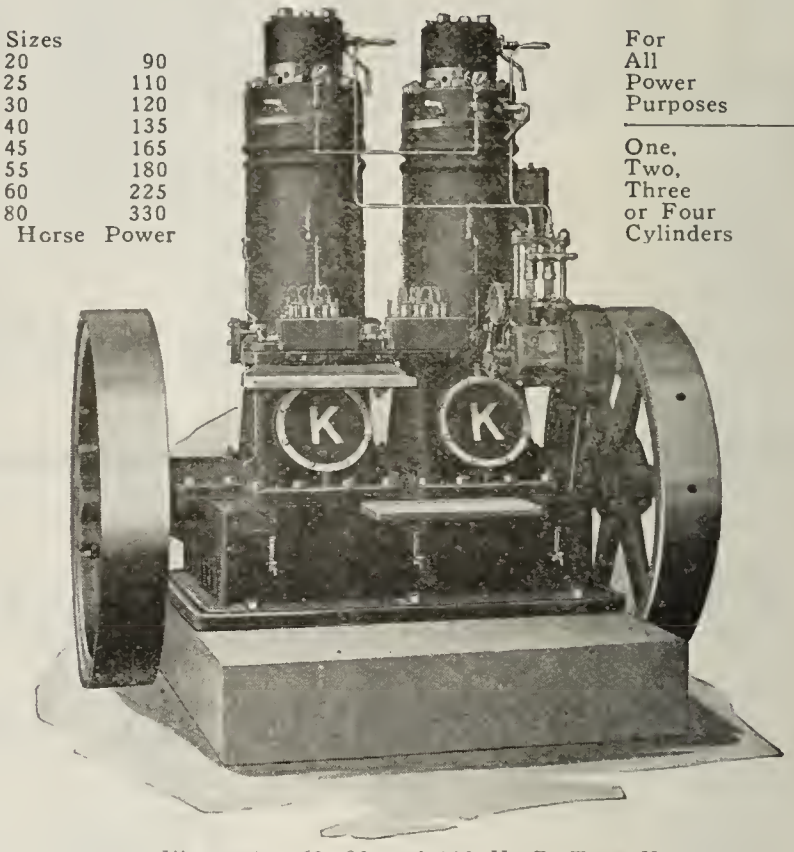
All the Name Implies

Lansing, Michigan

ANDERSON IMPROVED TYPE K

Medium Compression, Dry Mixture Oil Engine

Sizes
20 90
25 110
30 120
40 135
45 165
55 180
60 225
80 330
Horse Power



For All Power Purposes

One, Two, Three or Four Cylinders

Illustrating 60, 90 and 110 H. P. Type K.

This is The Oil Engine looked forward to for these many years. A happy compromise between a Diesel and a Semi-Diesel. It has most of the advantages of both types with their disadvantages absent.

WRITE FOR OUR LITERATURE

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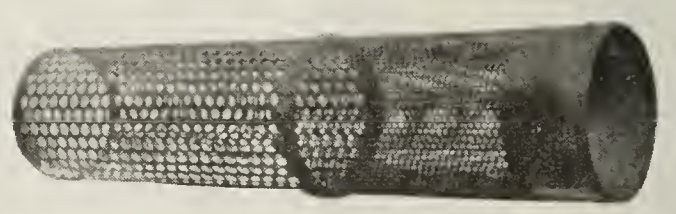
A.F. & M. Co.

FOUNDED IN 1872 CAPITAL $1,400,000.00

ANDERSON, INDIANA, U.S.A.

PERFORATED SCREENS



Made to suit your requirements. Advise diameter, length, thickness and size of perforations required.

NORTMANN DUFFKE CO.

1220 27TH AVE.

MILWAUKEE - - WIS.

More Than An Ordinary Gear

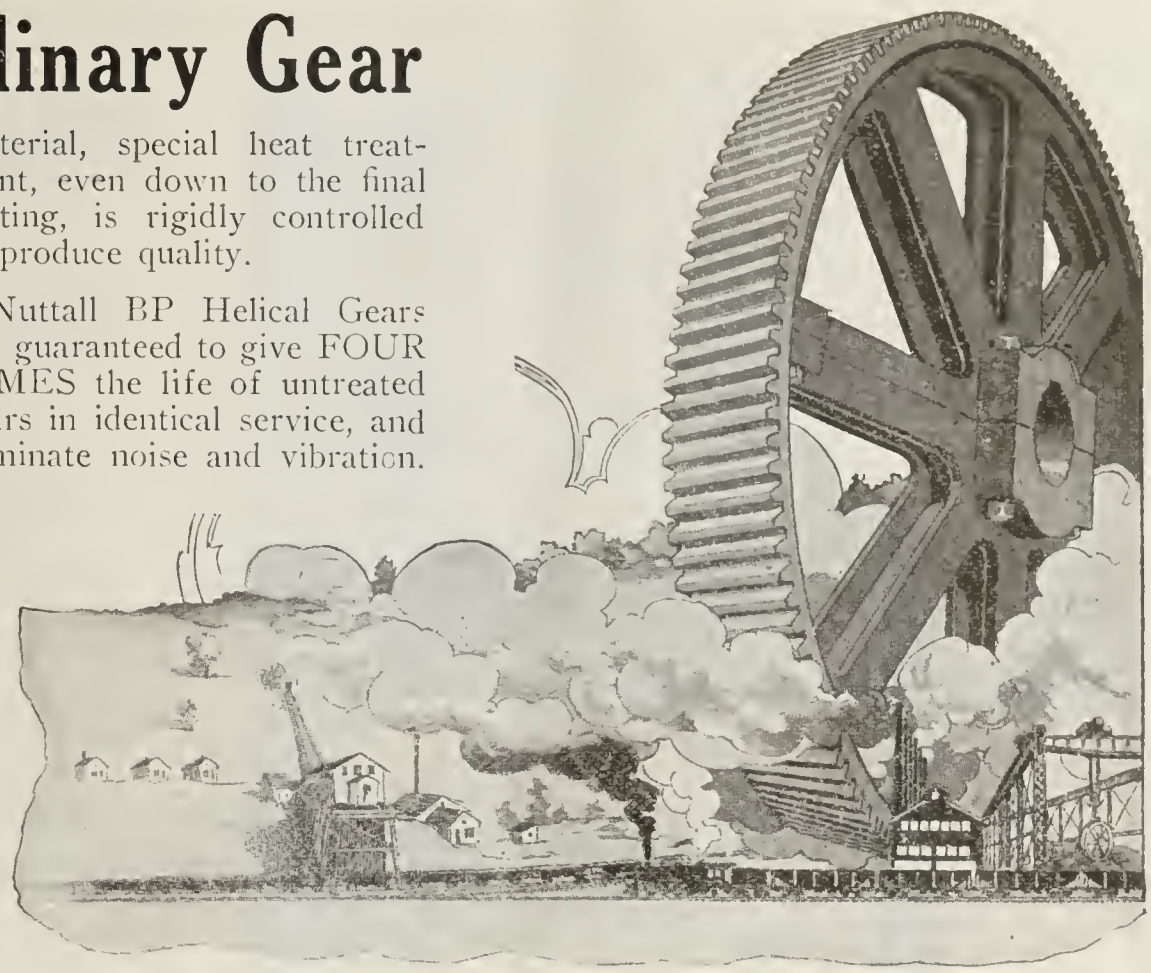
Nuttall BP Helical Gears have proved to be the highest grade gears that the engineering field has to offer to various industries such as steel mills, coal and metal mines, rubber and glass factories, machine shops, etc.

The secret of their superiority lies in two principles which the Nuttall Company has always followed in the manufacture of gears, namely—

(1) Correct design—A specially and carefully designed type of gear for each particular requirement.

(2) Quality of Construction—Every process, including selection of raw material, special heat treatment, even down to the final testing, is rigidly controlled to produce quality.

Nuttall BP Helical Gears are guaranteed to give FOUR TIMES the life of untreated gears in identical service, and eliminate noise and vibration.



R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

Nuttall

BATES
VALVE BAGS
INSURE SAFE DELIVERY

If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

THE VALVE BAG CO. OF AMERICA

TOLEDO, OHIO

Analyze Your Drilling and Blasting!

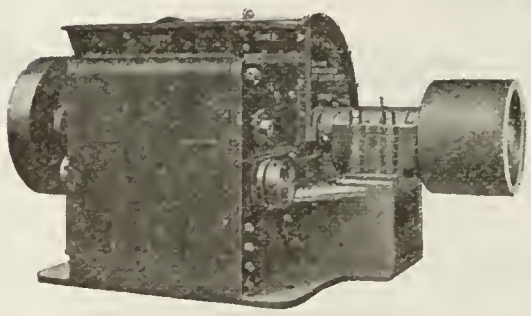
Our new Blast Hole Catalog B-46 (96 pages) will help you.

The day of poking a hole down with a rivet header or a converted hay bailer is past.

Drilling, being the first step in stone production, is the most important. One cent or one half cent per ton cost saved in this operation often eliminates competition.

With Cyclone No. 14 Drills on the job and Cyclone Service in reserve, your drilling and blasting troubles fade—and your costs will be right!

THE SANDERSON-CYCLONE DRILL CO.
ORRVILLE, OHIO.
Eastern and Export Office: 30 Church St., New York.



THE TERRIFIC STRENGTH IN THE DIXIE SWING HAMMER CRUSHER

is an assurance of exceptional economy and dependability in your crushing and pulverizing.

The Dixie Crusher is the result of 30 years' experience in the manufacture of all kinds of crushing and grinding machinery and is a perfect product in every respect.

It is simple, durable, efficient, turns out a uniform product at a minimum cost in power and maintenance, built in any size from one ton to 500 tons per hour.

Catalog will be sent upon request.

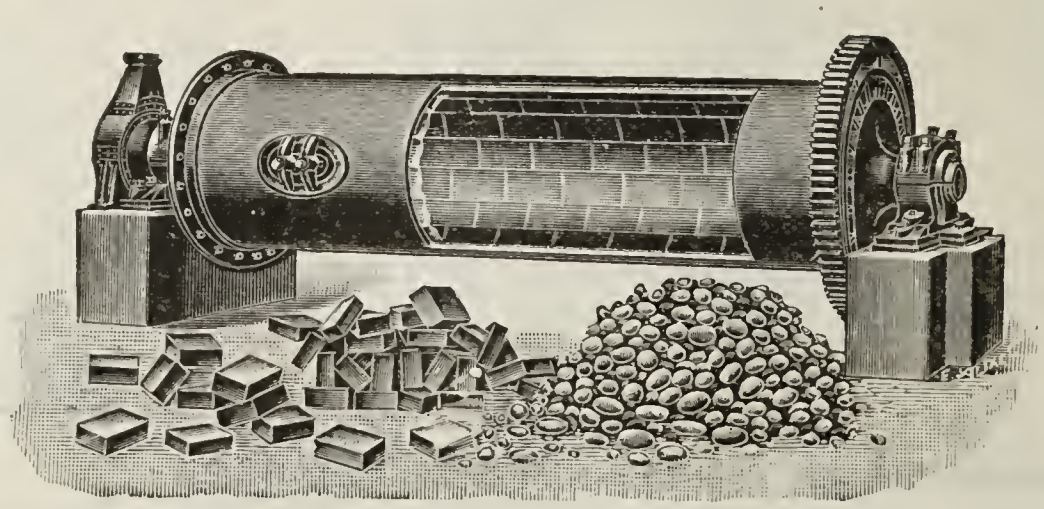
DIXIE MACHINERY MFG. CO.
3661 MARKET ST. ST. LOUIS, MO.

First Class Silex Slabs

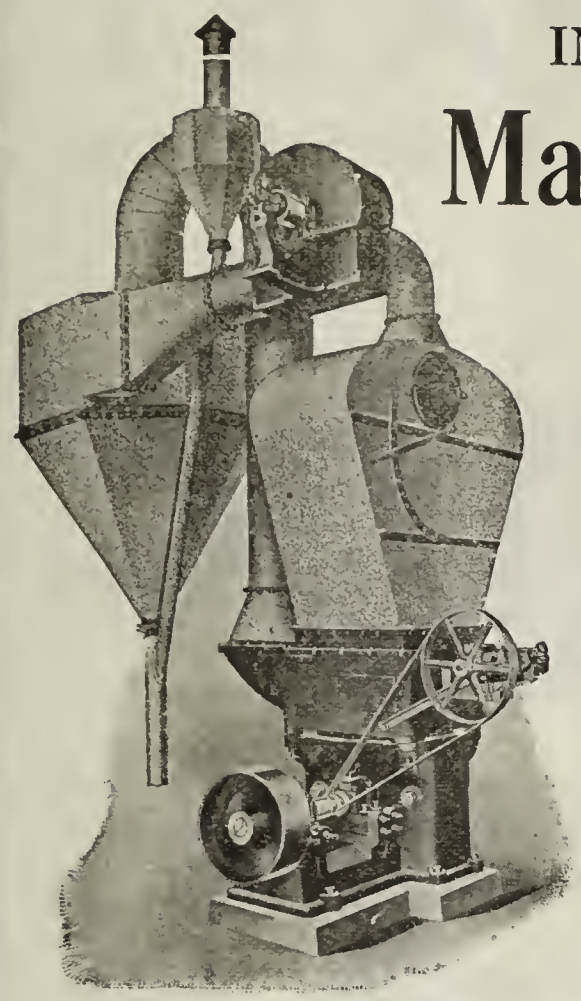
for lining of tube-mills for grinding of Cement, Clinker, Kaolin, Phosphate, Limestone, Quartz, Trap, Coal, Ores, Gypsum, Feldspar, Sand, etc.

Have successfully passed some of the most severe tests. Long life and moderate price. Immediate shipment on stock sizes. Write for prices.

Societe Generale Meuliere
La-Ferte-sous-Jouarre (S-&-M)
(France)



Complete Grinding IN ONE Machine



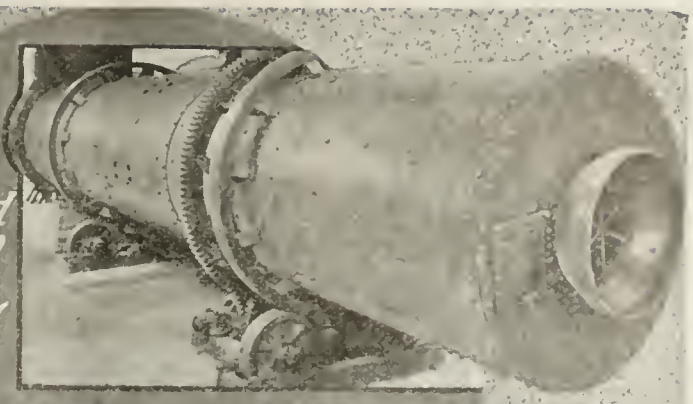
In successful use grinding Cement, Clinker, Limestone, Coal

INSTANT REGULATION OF FINENESS

NO DUST

Send for Cir[illegible]

THE BONNOT CO.
CANTON, OHIO



Highest Thermal Efficiency

Ruggles-Coles Dryers

60% + 15% = 75%

60% Thermal efficiancy is easy enough to attain when using almost any good method of drying.

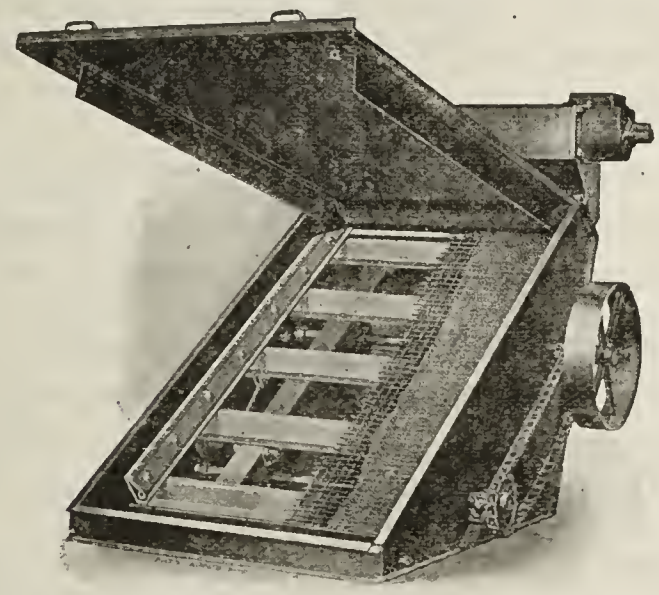
To obtain 75% efficiency day in and day out is an entirely different matter.

It is that 15% additional thermal efficiency that is insured where the Ruggles-Coles Dryer is used.

A study of the principle upon which Ruggles-Coles Dryers operate will convince you that such a saving is easily obtained.

Ruggles-Coles Engineering Co.
120 Broadway, New York
Works: York, Pa.

STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY



"Bucking Broncho" Separator

A plant that tries to screen without a "Bucking Broncho" has yet to know true screen efficiency.

A simple, durable, inclined screen, built upon principles never before attempted, and which has proved a remarkable success. It not only has all the vibratory motion of other screens, but also has many others, not heretofore utilized. It not only has the ordinary up and down motion, but has a further to and fro and lateral motion, as well as a rotating motion, together with many slaps, jars and shakes. This tremendous amount of vibration not only screens the material far better than any former device, but also considerably augments its capacity per square foot of screening surface.

Its screening surface is not stretched, yet it cannot sag even if one stands upon it, because it is held up by the coarse foundation wires, resting on the saddle.

CRUSHERS—GRANULATORS—GRINDERS—PULVERIZERS—
SCREENS—MIXERS—ELEVATORS—CONVEYORS—CHUTES

STURTEVANT MILL CO., BOSTON MASS.

HARRISON SQUARE

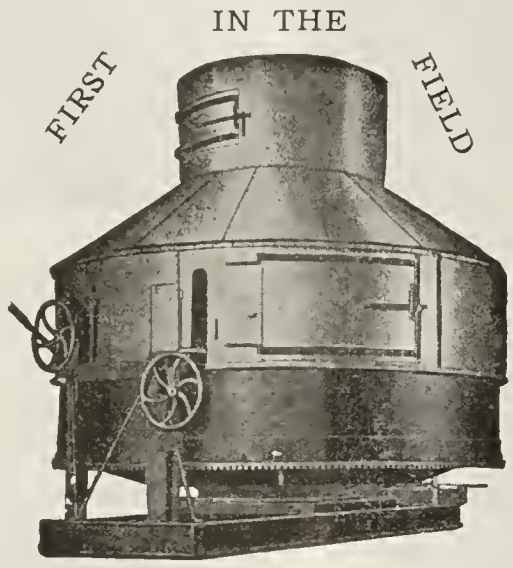
NEW YORK, SINGER BLDG. CHICAGO, PEOPLES GAS BLDG. PITTSBURGH, 1ST NAT'L BANK BLDG. ATLANTA, HEALEY BLDG.

THE CHOICE OF LIME OPERATORS

Like all Modern Hydrating Plants the Ladd Lime & Stone Co. is equipped with a Clyde Hydrator.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.



Simple, easiest to operate and most economical in cost of installing, maintaining, and operating.

Send for Catalog

H. MISCAMPBELL

Patentee and Sole Manufacturer

DULUTH - - MINNESOTA

SWABY

Gravel and Dredging Pumps

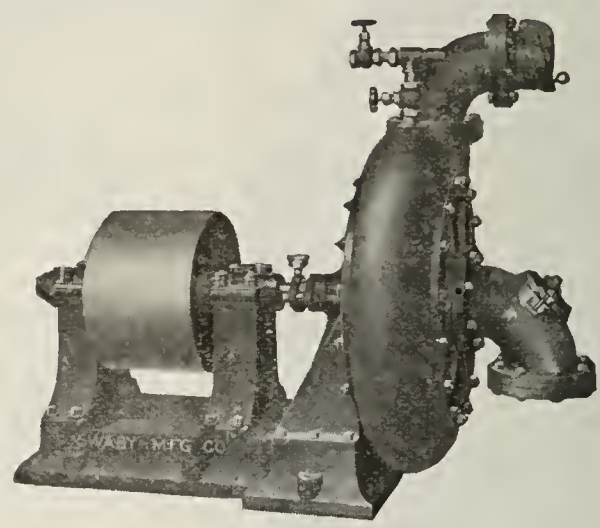
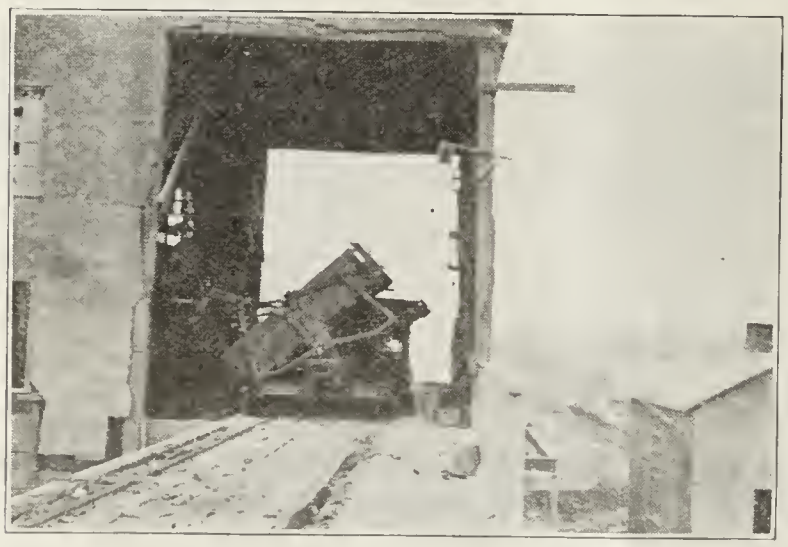


Illustration shows belted outfit but can also be supplied direct connected to Vertical Engine upon same base.

Swaby Manufacturing Co.

2010 MARSHALL BLVD.
CHICAGO, ILL.

Dump Cars in Cement Manufacture



Northwestern States Portland Cement Company's Western 6-yd. dump cars at crusher.

Portland Cement Plants are installing Western 6-yd. dump cars, where standard gauge equipment is desired, and Western 4-yd. or 5-yd. cars, where narrow gauge.

Local conditions determine the size of car, but almost invariably it is a **Western**—for stripping, for handling shale and often for handling stone.

The Lehigh Portland Cement Company, in stripping off shale, dumps a train of six 4-yard Western cars in from 17 to 25 seconds, without stopping the train, and keeps it up all day.

Whatever your haulage problem, there is a Western car that will solve it. Let us help if we can.

Write Today

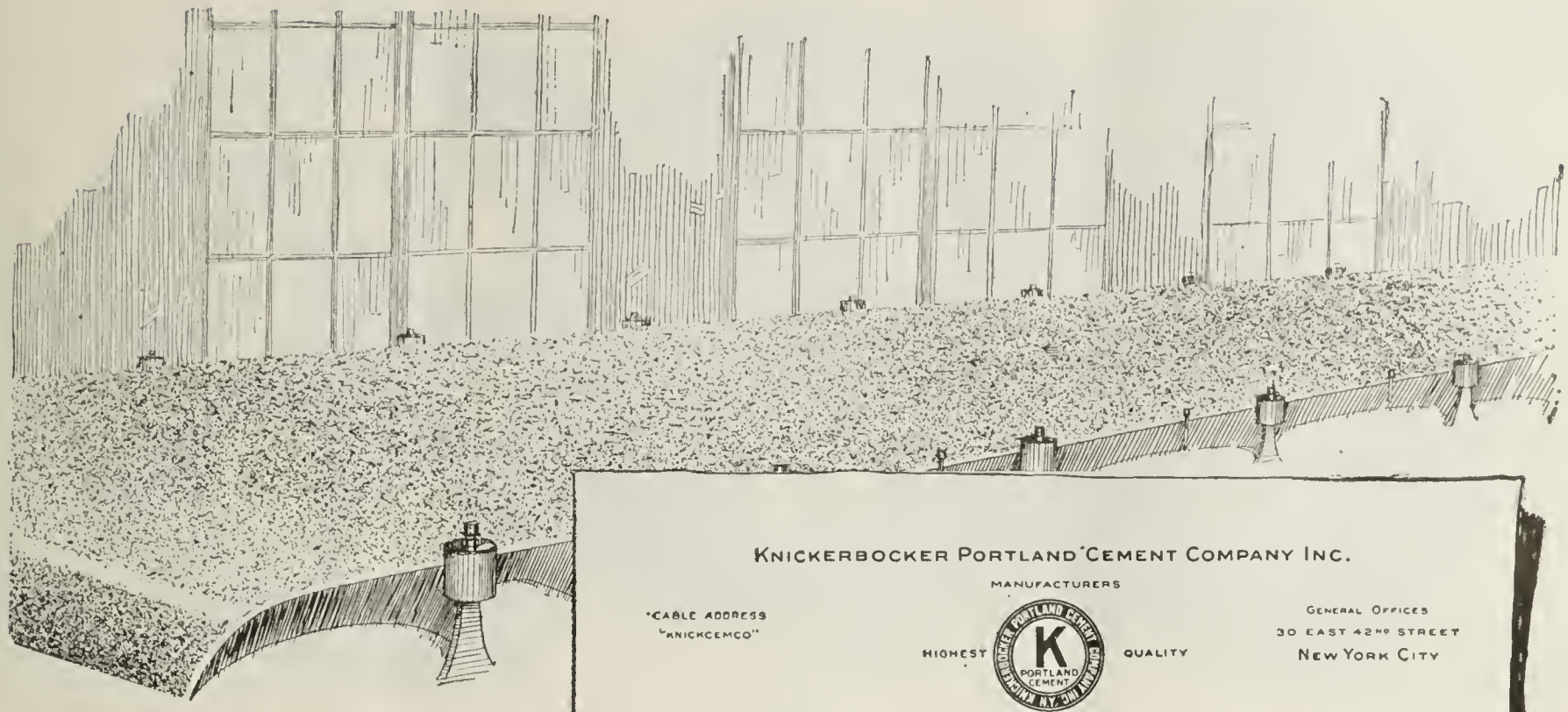
Western

That's Why

Western Wheeled Scraper Company

Earth and Stone Handling Equipment

Aurora, Illinois



KNICKERBOCKER PORTLAND CEMENT COMPANY INC.

MANUFACTURERS

"CABLE ADDRESS "KNICKCEMCO"

HIGHEST QUALITY

General Offices
30 EAST 42nd STREET
NEW YORK CITY

HUDSON, N.Y.

July 20, 1921.

R.D.Skinner & Co., Inc.
150 Nassau St.,
New York, N.Y.

Gentlemen:

On December 26, 1920, we placed in service a conveyor requiring 680 feet of belting, 20 inches wide. This conveyor belt had to handle hot cement and to make a test of the various beltings, we used two pieces of standard rubber belting manufactured by the best rubber belting companies and one piece of Lion Paw belting purchased from you and made by the Buckner Process Company. To-day, I made a thorough inspection of the three different kinds of belting and found that the rubber belting is deteriorating rapidly. The rubber cover is cracked, because it is becoming vulcanized. I do not believe the rubber belting will last more than 8 months longer. The Lion Paw is in first-class condition and looks to be practically as good as when it was first put into service. I firmly believe that this Lion Paw belt will last at least twice as long as the rubber belt.

There is no question about the superiority of Lion Paw over rubber belting in handling hot cement and I personally would not purchase anything but Lion Paw for this class of work.

Very truly yours,

O.E.Nassoi
Superintendent.

OEW:S

KNICKERBOCKER FOR STABILITY

LION PAW BELTING

THIS letter from one of the country's large cement manufacturers speaks for itself. Lion Paw makes an excellent conveyor belt because

It never cracks or becomes stiff.

Its interwoven construction, internal lubrication and special coating prevent grit, dust and crushed stone particles from penetrating.

It resists heat, acid fumes and water.

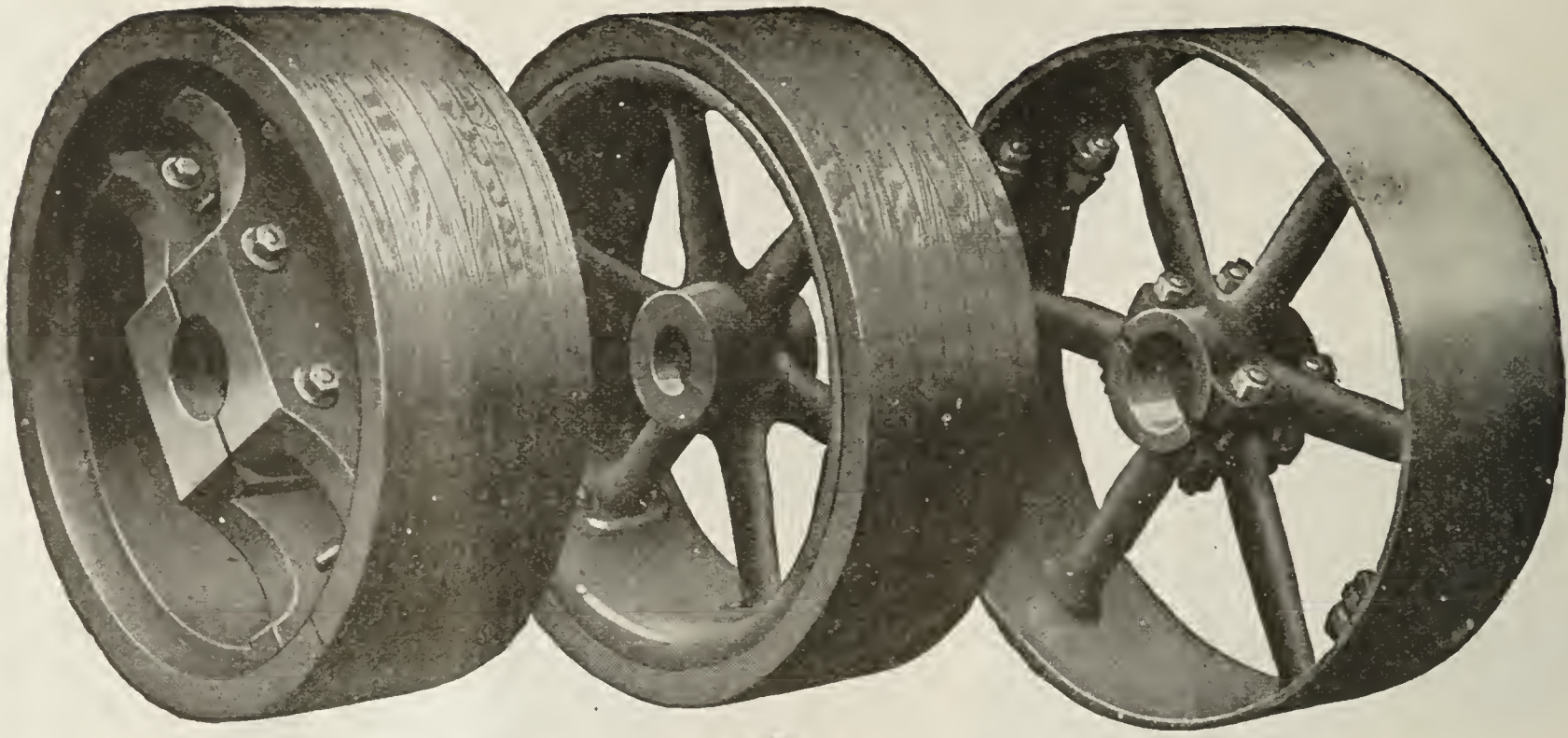
Its tensile strength and wearing qualities are exceptional.

A trial of Lion Paw Belting will make you as enthusiastic as the writer of this letter. Lion Paw will cut belting costs in *your* plant.

Write for samples, prices and the terms of our guarantee.

LION PAW BELTING

R.D. Skinner & Co. Inc. 150 Nassau St., New York City



DODGE

A pulley for every purpose

There is a specific place for every type of pulley; two different types will not render the same service in the same installation. To this, however, not everyone will agree.

While Dodge is at all times ready to give without prejudice an opinion as to the pulley best suited for any purpose, the fact that that opinion will not always be accepted is not lost sight of. Because of it the Dodge line has been extended to include every type of practical pulley.

Dodge "Independence" Wood Split; Iron Center Wood Rim; "Standard" Iron Split; Keystone and Oneida Steel Split; they are all Dodge-built, Dodge-guaranteed and Dodge-spirited.

Whatever your opinion as to type, be sure it was built by Dodge.

KEYSTONE

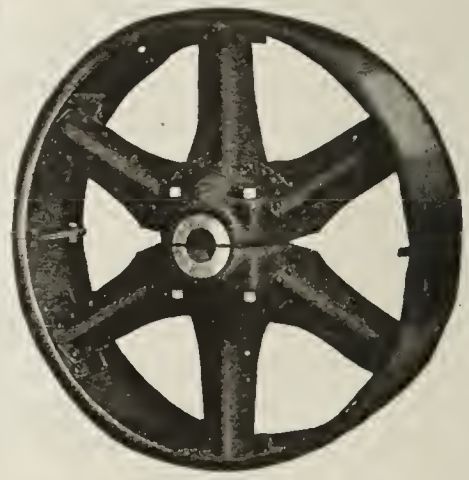
Dodge Sales and Engineering Co.

General Offices: Mishawaka, Ind.

Works: Mishawaka, Ind., and Oneida, N. Y *Canadian Plant:* Dodge Mfg. Co. of Canada, Ltd., Toronto and Montreal

Philadelphia Cincinnati New York Chicago St. Louis Atlanta
Boston Pittsburgh Minneapolis Houston Seattle Newark

NATIONAL



ONEIDA

Cement and Engineering News

Vol. 33 Chicago, October, 1921 No. 10

Only Products of High Quality and Dependability Assure Permanent Success

Through the distribution of misinformation and presentation of glowing accounts of quick fortunes in making concrete products, many have been drawn into it who do not have the proper equipment, experience and knowledge of permanent success. Today, with the unprecedented demand for concrete products, there is a tendency in some quarters to rush out the finished products, place them in use and get the money out of them, with little regard to the quality or the permanent satisfaction which will be obtained. With this condition confronting us, the concrete product today is going through another test period to determine whether or not the user in buying a concrete product can depend on durable and lasting quality.

The various concrete products organizations must stand first of all for products of high quality and dependability. The various associations of concrete products manufacturers, including local, state and national associations of block manufacturers, concrete pipe manufacturers, block machinery manufacturers, cement silo stave manufacturers, etc., will be short-lived and miss their objective unless they place quality first. By urging standard practices in manufacture, a thorough knowledge of the quality of materials used, best methods of combining materials for given product, and a thorough curing of the products before they are delivered on the market, more can be accomplished for the future welfare of the concrete products industries than in any other manner.

Too much emphasis cannot be placed on the importance of thorough curing. Length of time for a concrete product to be cured before it is ready for shipment cannot be stated in general terms. For each class of products, namely, pipe, tile, ornamental concrete, silo staves, concrete blocks or what not, there is accurate knowledge as to the condition the product should be in before it is ready for delivery on the market. It is within the possibilities of every manufacturer to avail himself of this information. He should obtain the facts from all the sources possible, read and study them and develop his business according to the recommendations which will produce the highest quality of product. There is perhaps no industry in America with which information and assistance to the users is furnished with so lavish a hand as the concrete industry. The manufacturers of all materials, aggregates, cement, reinforcing steel, etc., have highly organized associations for publicity and extension work, and they are almost unanimous in working to develop an intelligent use of the materials which they furnish.

The present demand for building products furnishes opportunity long desired for popularizing precast concrete building units. For years, with low-priced products of competing materials in abundance, the consuming public, though favorable to concrete, was reluctant to change from well-established customs. With a demand for all building products, the time has come when the products manufacturer can establish himself securely. He can only retain his prestige in future years, providing he maintains high quality during this decisive period. Lack of knowledge is the root of all evil.

Cement Bricks Declared Superior to Clay

May Effect Radical Change in Provisions of Building Codes.

Elaborate tests, whose results will form the basis of revisions in building codes, are now going on at Columbia University. So far these tests seem to show the superiority of the cement and concrete brick over the clay brick now in use. Conclusive data is being obtained and, when complete, will, it is declared, remove handicaps now imposed upon the cement and concrete brick industry.

"Various kinds of cement and concrete bricks designed and manufactured to compete with clay bricks used extensively in the building industries of New York City have been tested at the testing laboratories of the department of civil engineering, Columbia University," said a statement by Prof. Albin H. Beyer, director of testing, who also, as chairman of a subcommittee of the American Society of Mechanical Engineers, has been conducting a thorough investigation of the theory of elastic failure of the ductile ferrous metals.

"The manufacturing processes and the quality of these new kinds of brick have already reached the stage of active competition with the better grades of clay bricks.

"In co-operation with the Bureau of Buildings of New York City an extensive investigation is now being carried on at Columbia University with the view of determining the comparative strength of similar masonry structures built with cement, concrete and clay bricks. The tests completed to date indicate that the ratio of the average strength of brick masonry to the average strength of the individual brick composing this masonry varies widely with the kind of material of which the brick is made.

"Under the existing building codes, to our knowledge, cement and concrete bricks are only accepted as building materials, under the specifications and standard physical tests for clay building bricks. It is now being realized that due to the wide variation in the physical properties, strengths and behavior of these different kinds of brick mentioned, the standard specifications for clay bricks cannot in fairness be applied to the cement and various kinds of concrete brick developed to date.

"The investigation should be of great value to engineers, architects, and builders, and should form the basis of revisions required in building codes, to cover this new kind of building material.

"At present the cement and concrete brick industry is now handicapped to a material extent by the lack of provisions in the building codes for this new material, but before the necessary provisions in the codes can be made, reliable and conclusive test data must be available. The tests now being made will furnish the necessary data."

Cement Prices

High Cost Not All Due to Producers

Inaccuracies sometimes appear in printed comparisons of present cement prices with those of previous years. The false impressions thus created should be corrected.

Two factors affect the selling price of cement, viz.: price at the mill and transportation charges from mill to destination. Obviously it is improper to compare a mill price with a destination price. It is improper also to compare a price on cement delivered at destination by railroad with a price including charge for cloth sacks in which cement is packed with a price which does not include the package sacks.

Comparisons are further complicated by changes in freight rates. It is misleading to compare prices on cement delivered at a given destination at different dates when freight rates have been changed between the two dates.

In view of these facts it is apparent that in order to show the trend of the price of cement itself the unit for comparison should be the price at the mill exclusive of the charge for package. After the mill prices have been shown it may then be stated if desired that the gross price delivered at a given destination may be determined by adding to the mill price transportation charges and charge for package.

The price on cement at Buffington, Ind. (near Chicago), where the largest mill of the Universal Portland Cement Co. is located, is now only 56 per cent higher than in 1913, but the freight rate on cement from Buffington to Milwaukee, for example, formerly was 23 cents per barrel but now is 49 cents. This is an increase in freight rate of about 113 per cent.

Government reports are that the average price of all commodities now is about 51 per cent higher than in 1913. This average increase of 51 per cent compares with increases of 56 per cent in cement price and 113 per cent in freight rate.

In considering these comparative increases it should be borne in mind that the effect of increased freight rates is not confined to the cost of moving the finished cement from mill to destination. The higher freight rates apply also on raw materials shipped into the plant and thus affect the cost of manufacturing cement as do taxes, interest rates and other factors over which the manufacturer has no control.

A Rubber Tired Steam Shovel

The Osgood Company of Marion, Ohio, now have completed an Osgood 18¾ yd. Traction Revolving Steam Shovel equipped with solid rubber tires.

This shovel will be of special interest to Contractors or others who have jobs in the cities or elsewhere which require frequent moves over paved streets or highways without injury to the thorofares.

They are especially provided, as are all other Osgood 18 Traction Steam Shovels, with means for disengaging the traveling gears for towing by auto, truck or otherwise and with provisions for attaching the towing attachments or tongue. These features permit them to be towed with all machinery disengaged thereby requiring only a minimum of pulling power.

For traveling over streets or highways under their own steam all of these size shovels are provided with a two-speed gear arrangement by which is obtained a traveling speed of 3½ miles per hour.

Steering is accomplished by swinging the upper body slightly to right or left with instant response from the steering axle.

The tires are 40 inches diameter, by 14 inches wide, ribbed tread, mounted on steel rims. These are pressed on the regular 34 inch diameter by 16 inch face cast steel wheels which arrangements permits the removal of the tires when desired and by attaching the cleats to the rear wheels is then ready for service where it is not desirable to use the rubber tires.

This outfit so designed and mounted *eliminates the damaging of thorofares, permits movement from one location to another with ease, decreases disturbance and delays along the route,* whether towed or moving under its own power, *permits them to be moved at an astonishing rate of speed and eliminates the vibration usually experienced when running on steel wheels.*

Safety in Construction

Workmen and contractors are both vitally interested in the problem of safety first. This need of care in construction work is vital, for there are countless hazards to be met in the course of a day's work.

Patent scaffolds, particularly for interior work, are coming into use in this country. These are usually metal horses made by the Economy Scaffold Co., 4611 W. Fulton St., Chicago, which may be adjusted to any desired height, and are light and easily packed for movement. This practice is in accord with the American practice of reducing lost time and trouble to the minimum, which helps make possible low unit costs.

Masons' and plasterers' scaffolds should be constructed carefully. They must carry not only the weight of the men, but also the added burden of stacks of brick or heaps of mortar and plaster. They should be provided with guard rails, and frequently with nets, not only to protect the workmen on the scaffold, but also those who must work beneath it. Thus it will be seen that in figuring a scaffold, its convenience, strength, and safety must all be given careful consideration.

Those who are especially interested in the subject of safety engineering as applied to scaffolds will find a very comprehensive discussion of the subject presented in the book on scaffolds by the Travelers Insurance Company of Hartford, Conn.

Portland and Other Cements

Largest Output in 1920 in History of Industry—More Than 100,000,000 Barrels.

The production of Portland cement in 1920 was 100,023,245 barrels, exceeding that in 1917, the next highest year in production, by 7,209,043 barrels. This amount was an increase of 24 per cent over the production in 1919—80,777,935 barrels. The stocks at the mills increased from 5,256,900 barrels at the end of 1919 to 8,941,046 barrels at the end of 1920.

Estimates of the production and shipment of Portland cement in 1920 published by the United States Geological Survey February 14, 1921, were only about 0.3 per cent and 0.02 per cent, respectively, higher than these final figures for the year, compiled under the supervision of Ernest F. Burchard, of the United States Geological Survey, Department of the Interior.

The shipments in 1920 amounted to 96,311,719 barrels, valued at $194,439,025, as compared with 85,612,899 barrels, valued at $146,734,844, in 1919, an increase in quality of 13 per cent and in value of 33 per cent.

Of the 27 States in which Portland cement was manufactured in 1920, 21 showed an increase in shipments and 6 showed a decrease as compared with 1919, and 25 showed an increase in production and 2 showed a decrease.

There were increases in production in all the commercial districts and increases in shipments in all except three as compared with 1919, and yet the estimated Portland-cement manufacturing capacity utilized during the year was only about 66 per cent.

Four plants that were formerly active manufactured no cement during the year, one each in California, Kansas, New Jersey, and Virginia. Two plants, one in New York and the other in Oregon, resumed production in 1920 after a period of inactivity. One new plant began producing Portland cement in 1920—the Gulf States, at Spocari, Ala. The producing and shipping plants in 1920 numbered 117.

Prices at Mills

In 1920 the average factory price per barrel for Portland cement in bulk was higher in all the districts and ranged from $1.83 in Indiana and in the Illinois and western Indiana district to $2.46 in Michigan; in 1919 it ranged from $1.62 in Illinois and the Illinois and western Indiana district to $2.08, the average in Oregon and Washington.

The average factory price per barrel for the whole country was $2.02 in 1920, as compared with $1.71 in 1919, an increase of 31 cents per barrel, or 18 per cent. This is the highest average price on record since 1892. The lowest average price recorded was $0.813 in 1919 and 1912.

The combined production of natural and puzzolan cements in 1920 was 767,481 barrels, valued at $1,150,890, as compared with 528,589 barrels, valued at $583,554, in 1919. In 1920, 8 plants reported production of natural cement and 1 plant made puzzolan cement.

In its compilation of the cement statistics as summarized above, the United States Geological Survey had the cooperation of the geological surveys of Alabama, Georgia, Illinois, Iowa, Kansas, Maryland, Michigan, Minnesota, Missouri, New Jersey, New York, Oregon, Virginia, and Washington.

Exports and Imports

The exports of hydraulic cement from the United States in 1920 were 2,985,807 barrels, valued at $10,045,369, or $3.36 per barrel, as compared with 2,463,573 barrels, valued at $7,513,389, or $3.05 per barrel in 1919, showing an increase in quantity of more than 21 per cent and in value of nearly 34 per cent. The exports were sent principally to South America, the West Indies, Central America, and Mexico.

The imports for consumption in 1920 were 524,604 barrels of 376 pounds, valued at $1,254,729, or $2.39 per barrel, as compared with 9,026 barrels, valued at $52,636, or $5.83 per barrel in 1919. This great increase in imports, which were largely from Canada, is noteworthy.

The statistics of exports and imports were compiled from records of the Bureau of Foreign and Domestic Commerce, Department of Commerce.

Zinc More Durable for Leaders Conductor Pipe and Gutters

Considering only materials, the initial cost of galvanized iron spouting is about one-half that of Zinc spouting. But to this must be added the cost of the labor for installation. On the average job of galvanized iron this labor cost about equals the price of the material. These two items of cost must be met with each replacement.

The erection cost of an installation of zinc spouting is about 25 per cent more than the cost for the same job if galvanized iron be used.

Therefore, the proportionate initial cost of zinc in comparison with galvanized iron is about as 162½ is to 100, or a little more than one-half as much again.

The cost of a zinc job, however, does not have to be repeated, while the full cost in the case of galvanized iron must be met with each new installation.

According to reliable estimates, a new installation of average galvanized iron spouting will be needed every five years. Zinc, on the other hand, once installed, lasts a lifetime.

After five years, therefore, your cost of galvanized iron spouting will be about one and one-quarter that of zinc; in ten years, a second replacement brings your cost to 182 per cent that of zinc; and every five years thereafter the cost of maintaining galvanized spouting on your property will be increased by almost two-thirds the initial cost of zinc. After 25 years the original cost of galvanized iron, together with required replacements, will be more than three times as great as the total cost of zinc for the entire period. Other replacements of galvanized spouting become necessary at the end of each subsequent five-year period, thus increasing your total expenditure correspondingly. Clearly, zinc effects a substantial saving in the cost of maintenance when installed at the outset.

Centrifugal Pumps

Centrifugal pumps are the subject of a bulletin recently issued by the American Well Works, Aurora, Ill. These pumps, it is said, embody the most advanced principles of design and represent the most modern high grade, standardized, highly efficient pumps it is possible to produce. The engineering department of the company is constantly working to improve the product. The bulletin contains many fine illustrations and several valuable tables.

New Memphis Sand and Gravel Plant

A modern sand and gravel plant costing about $250,000, independent of the price of the land has just been completed by the Missouri Portland Cement Company on a tract of land comprising 260 acres recently purchased along Chelsea avenue, Memphis, Tenn. It has a capacity of 2,000 tons per day. This new up-to-date plant will eventually result in a price reduction of sand and gravel at Memphis as they are now in a position to get the material at less money and of course, like all business, the cheaper the cost of production, the cheaper the product.

The company has constructed concrete storage bins 70 feet high, into which is taken the sand through an immense suction pipe with one end dropping down a distance of 30 feet below the surface of water, where a stratum of very fine sand and gravel is found. Mr. J. H. Lehaney, the Memphis general agent of the Missouri Portland Cement Co., whose main office is in St. Louis, says from reports of experts he believes the supply of this sand is inexhaustible. At any rate, the report of experts was so well received that his company decided to equip its Memphis plant with every piece of modern machinery required for the work.

They have constructed a steel hull dredge boat and located it in an immense pool of water at the base of the shore line, on which is installed all the pumping machinery.

The pipe being used now to pull the sand through to the bins is 60 feet long, extending from the barge. It is probably twice that distance to the point of where the pipe drops the sand into a washing table on the top of the 70-foot high bin, where the sand is washed and sifted through sieves so that it is graded into two lots. The gravel also passes through sieves and is likewise graded.

The end of the suction pipe protruding from one end of the dredge barge is handled easily by one man, who sets to work a piece of electrically driven machinery that gradually lowers the pipe to the stratum of sand and gravel. The pump, also electrically driven, is then started. It makes 350 revolutions a minute and is driven by a dynamo of 500-horsepower. The pump, being 16 inches in diameter, can handle 900 gallons of water, sand and gravel a minute, which is the given capacity of the gigantic pump.

As the sand goes whizzing through the suction pipe on its way to the sand pan, it sounds like a miniature water fall. At the top of the bin the water is separated from the gravel and sand and is returned to the little lake, whence it starts through wooden drains, worked practically on the same principle as those at copper, silver or gold mines.

The company has constructed its own switching yards. There is a mile of standard railroad track laid and men are now leveling the track and filling in the few places necessary to make it as modern as a well-constructed railroad. Two of these tracks extend under the bins, where sand is loaded direct from them to cars. There are provisions made at the side of the bins for trucks to be loaded direct and without interference with the loading of railroad cars.

Sand and gravel dredging plant, Memphis, Tenn. The 15-inch pump is operated by 50 h. p. motor

All the cars operated from the plant are owned by the Missouri Portland Cement Company, and have been constructed on modern ideas of loading and unloading with rapidity, thereby saving labor to shipper and receiver of sand.

Power to operate the plant is furnished by the Memphis Consolidated Gas and Electric Company, the electricity being conveyed to the plant on a 7,000-volt wire, where it is reduced to 2,300 volts by transformers.

The rugged construction and simple operation of "Lightning" sand and gravel dredging pumps manufactured by the Kansas City Hay Press and Tractor Co., Kansas City, Mo., assures maximum efficiency in the operation of sand and gravel dredging problems at all times. They are easy to adjust and easy to replace parts. Thousands of them are in successful operation which is a striking endorsement of their dependability.

Casting and Steaming Reinforced Pipe

Ten Miles of 5½-foot Pipe, Costing $1,350,000 When Laid, Was Fabricated and Seasoned in the Contractor's Yard at Transcona, Canada

The 99-mile aqueduct with a capacity of one hundred million gallons of water daily for the city of Winnipeg, Canada, is built chiefly of horse-shoe-shape concrete conduit, but includes ten miles of reinforced concrete cylindrical pipe 5½ feet in diameter and 8 inches thick, which is subjected to a static working pressure of about 30 pounds per square inch.

The pipe was made in a special casting yard at Transcona by the Canada Lockjoint Pipe Company, Limited, for the general contractor, the Winnipeg Aqueduct Construction Company, which executed the work designed by Consulting Engineer James H. Fuertes.

Design

The pipe was made with a mixture of 700 pounds (3.8 cubic feet) Portland cement to one yard of 1:1½:2½ concrete, using very well graded aggregate and mixed to a jelly-like consistency that easily flowed to place when slightly puddled.

The pipes are reinforced, 2 inches from the outer surface, by spiral coils of ½ to ⅝-inch square steel rods wired to longitudinal rods and enclosing cylindrical reinforcement of heavy woven American Steel & Wire Company's triangular mesh fabric 2 inches from the inner surface of the pipe.

The inner and outer cylindrical surfaces are uniform throughout, the hub and spigot joints being made entirely within the regular thickness of the pipe. Joints were made with 1:1 cement mortar, with crimped copper sleeves providing watertightness under longitudinal expansion and contraction movements.

Casting Yard

The 500 by 2,600-foot level area used for a casting yard had standard gauge tracks, connected at one end of the yard with the main-line tracks of the Canadian Pacific railroad and at the other end with the standard gauge tracks of the Municipal Service line paralleling the aqueduct, over which the finished pipe were delivered to required positions alongside the trench. On the longitudinal axis of the yard there was installed 1,100 feet of 8-foot gauge track connecting the mixing plants at both ends of the yard and serving for the operation of the two pipe-casting travelers. About 150 feet each side of this track there was a parallel standard gauge track for loading and shipping the finished pipes.

Between the traveler track and each loading track there were located 144 heavy concrete bases on which the pipe forms were set and the pipes were cast.

At each end of the yard there was a low trestle over which cars of graded sand and gravel were delivered to storage bins of an aggregate capacity of 3,000 yards, which were provided with steam pipes to warm the aggregate in the winter, and, from which there were supplied by gravity a battery of four Jaeger concrete mixers, each of 10-foot capacity.

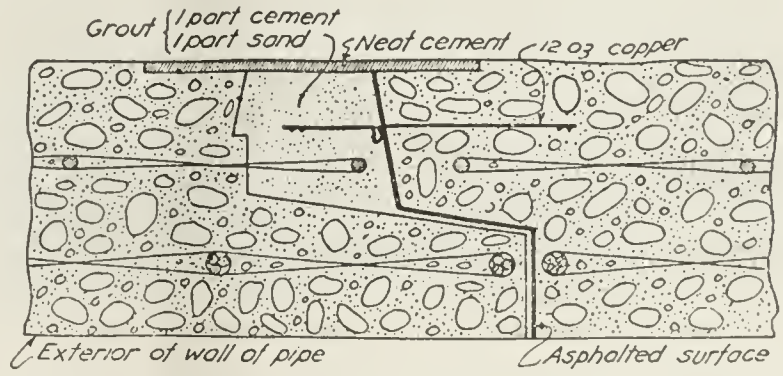
The contractor's offices and service buildings were located midway between the mixer plants, and reinforcement storage and assembling yards were located between the mixing plants and the ends of the casting yards, which were symmetrical about both longitudinal and transverse axis.

Casting the Pipes

For interior reinforcement, the woven mesh was formed on collapsible mandrels, the overlapping edges

Placing reinforcement in forms

were wired together, the fabric was reinforced by rods wired on when necessary, and the cylinders were stored until required for use. The exterior reinforcement was made from straight rods bent at the yards over mandrels to form the spirals that were wired to longitudinal rods, making complete skeletons placed as units in the forms. Each form was assembled on a grooved cast-iron bottom piece on the concrete slab. The collapsible steel interior form was set on it and carefully centered. The concentric fabric reinforcement was placed around it and seated in the annular groove in the bottom casting, which was then filled with sand. The skeleton reinforcement was centered



Watertight expansion joint with extensible copper sleeve

over the fabric reinforcement and the exterior steel form, consisting of two longitudinal halves connected by pivoted latches, was set in place.

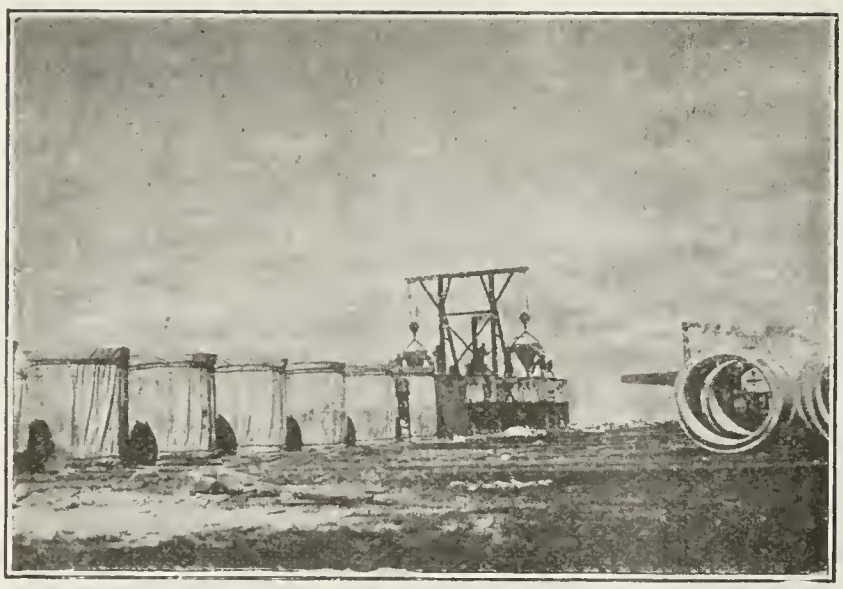
The top of the inner form was closed by the working platform set on it, and grout was poured into the bottom of the form, after which the form was filled with concrete to a point near the top, when mortar

Delivering concrete to working platforms on forms

Lifting stripped pipe from casting slab

was added and a steel spider centered with the form to support the joint mould and the copper sleeve.

Each battery of four mixers discharged into special 1½-yard conical steel buckets set in a pit and handled by tackles suspended by the overhead horizontal arms of the two steel travelers on the center track, along which it was traversed by its hoisting engine winding an anchored line. The concrete was deposited in the center of the working platforms and thence filled by hand into the forms and tamped. The discharge of



Pipes enclosed in canvas hoods and jackets to retain steam

the concrete from the buckets to the platforms was regulated by the ball valves at the bottoms of the buckets that were operated by exterior levers. Each traveler delivered concrete to two forms simultaneously and was operated by ten men, including engine man and concrete gangs, and cast pipes at the rates of 36 pieces, or 288 lineal feet, per day.

Curing and Handling the Pipes

As soon as the pipes had been cast, the forms were covered by canvas jackets laced up and down the vertical joint and secured to the concrete base. The canvas hood, supported by wooden arms attached to the spider so as not to displace the light copper sleeve, was placed on top of the cylinder and laced to it. Live steam was admitted to the interior of the pipe through one center jet and four equi-distant circumferential jets piercing vertically through the concrete base.

When the pipes were twenty-four hours old the jackets were removed and the forms were stripped, cleaned, assembled, and used on another set of pipes. The jacket and hood were replaced and steam was again turned on for two or three days before the pipes were removed from the concrete bases and stored on the skids.

The pipes were lifted from their bases by a horizontal beam about 7 feet long attached to a hoisting tackle on the traveler suspended from one end of the traveler cap, and counterweighted by a balance box suspended from the opposite end of the cap.

At each end of the hoisting beam there was attached one end of a chain that was wove around sheaves at opposite ends of a flexible semi-circular steel band placed horizontally on the outside of the pipe midway between the ends.

Putting the hoisting strain on the chain developed a tension that pulled this band tight and produced sufficient friction to enable it to lift the pipe section free of the base, after which it was easily revolved about the center of gravity in a line passing through the chain sheaves, and when in a horizontal position was lowered to rest on wooden skids transverse to the traveler track.

The pipes were first rolled to the outer ends of these skids and afterwards the space between them and the derrick track was filled with additional pipes stored until required in the trench, when they were removed from the outer ends of these skids by locomotive cranes that transferred them to cars on the service track. While the pipes were seasoning in the yard or on the skids, they were periodically sprayed with a water jet to prevent dehydration.

Locomotive crane loading pipe on cars

New Ohio Limestone Crushing Plant

The new limestone plant of the Columbia Chemical Co., F. A. Jones, manager, Zanesville, Ohio, was built in three distinct units, the first unit being the crusher house and the second and third units being screening houses. Unit No. 1 contains a No. 50 "Superior" (Worthington) gyratory crusher, having two receiving openings 50 in. by 13 ft. This crusher is large enough to take the largest stone that a 5 cu. yd. dipper will load on the quarry cars. It is the second largest gyratory crusher in operation, the exception being that of the Michigan Limestone & Chemical Co., at Rogers City, Mich., which is a No. 60 "Bull-Dog" crusher (Traylor).

From the crusher the stone is distributed into a steel receiving hopper having a capacity of 25 tons, under which is located a 6-ft. steel apron feeder, which feeds the stone in a uniform stream to a 36-in. belt conveyor of 256 ft. centers, with a rise of 70 ft. The belt conveyor deposits the stone in the No. 1 screen, in Unit No. 2.

Effect of Organic Impurities on Concrete

Minute Quantities of Tannic Acid Reduce Strength One-half. Surface Loam Always Reduces Strength. Other Conclusions from an Investigation.

It has long been recognized that impurities of an organic nature reduces the strength of concrete, even in some cases entirely destroying the hydraulic properties of the cement. This is probaly the reason for the weakness of concrete caused by the addition of loam in small quantities, although small percentages of clay thoroughly admixed do not seem to be injurious.

A general investigation of the effect of organic impurities has been conducted by Prof. Duff A. Abrams of Lewis Institute, and the results have been published recently by the Structural Materials Research Laboratory as a reprint from the Proceedings of the American Society for Testing Materials for 1920.

It was impossible to secure natural sands containing different known percentages of organic materials for a study of the quantitative effect of scuh impurities, and the laboratory therefore investigated the effects of tannic acid as a surface coating for sand particles, having decided that the effect upon the strength of concrete was practically the same as that of the organic impurities found in top soil. These investigations were begun in 1915 and continued for four years or more. Tannic acid was applied as a surface coating in various quantities up to 0.4 per cent by weight. Compression tests were made on 3-inch by 6-inch concrete cylinders. Mixes were used varying from 1:5 to 1:2. The size of aggregate ranged from a fine sand to a ¾-inch graded aggregate. Tests were made on all mixtures and sizes of aggregates at ages of 7 days, 28 days, 3 months, 1 year and 2 years, specimens being stored in damp sand. About 2,000 tests were made in this investigation. The principal conclusions from the investigation were as follows:

1. It is believed that the results of these tests are, in general, typical of the effect produced by organic impurities in concrete, judging from tests with natural sands containing organic matter, made in Lewis Institute and other laboratories.

2. The strength of concrete was reduced for all percentages of tannic acid, for all mixes and ages covered by these tests. Less than 0.1 per cent of tannic acid in terms of the weight of the aggregate may reduce the strength of the concrete to one-half its normal value.

3. Lean mixtures are more affected by tannic acid than the rich ones.

4. The mixtures from the finer aggregates are less affected by tannic acid that those from the coarser aggregates.

5. All of the effects mentioned above may be summed up by saying that the reduction in strength of concrete is a function of the consruction of the concentration of tannic acid in the mixing water. An equation is given which represents this relation for the 28-day tests.

6. The results of these tests indicate that the wetter consistencies would be less affected by the presence of organic impurities than the drier ones.

7. The strength falls off rapidly for small percentages of tannic acid and less rapidly as higher percentages are reached.

8. The 7 and 28-day strengths are reduced to a greater extent by tannic acid than at ages of 1 and 2 years.

9. Some of the 1:5 mixes in which the higher percentages of tannic acid and the finer sands were used (2 to 3 per cent solution) disintegrated before the time of test. The 1:7 mixes (3 to 5 per cent solution) were destroyed in removing the molds.

10. The tests confirm the results of many other investigations made in this laboratory in showing the fundamental dependency of strength of concrete on the quantity of mixing water as expressed by the water ratio.

11. The strength of concrete (stored in a damp place) both with and without tannic acid increased with age. The strength for a given condition was a logarithmic function of the age.

The paper herein referred to gives the complete figures of the tests on which these conclusions are based and also diagrams prepared from such figures.

Attention is called to the colorimetric test using sodium hydroxide as a convenient method of testing for organic impurities in natural sands. This test consists of shaking the sand thoroughly in a dilute solution of sodium hydroxide (NaOH) and observing the resultant color after the mixture has been allowed to stand for a few hours. For this purpose fill a 12-ounce prescription bottle to the 4½ ounce mark with the sand to be tested. Add a 3 per cent solution of sodium hydroxide until the volume of sand and solution, after shaking, amounts to 7 ounces. Shake thoroughly and let it stand for 24 hours. If the solution at the end of that period is colorless or has a light yellowish color, the sand may be considered satisfactory in so far as organic impurities are concerned. On the other hand, if a dark colored solution is produced, the sand should not be used in high-grade concrete, or used only after mortar strength tests have shown it to be satisfactory for the purpose.

The report states that surface loam always decreases the strength of a properly proportioned concrete, both because of the presence of organic materials and also because additional water is required to produce a concrete of a given plasticity. There are cases in which a coarse sand will give a stronger concrete if loam or other finely divided material be added, but in such cases the addition of fine sand would be much better, the increase in strength due to the better grading of aggregate secured by the addition of loam being more than sufficient to counterbalance the ill effects of the organic material.

It seems to be definitely indicated by these results that care should be taken to eliminate surface loam from sands to be used in mortar or concrete.

Care should always be taken to remove the overburden of soil in sand and gravel pits. Washing conducted on a comprehensive scale is generally effective in removing loam when mixed with sand or gravel.

Breaking Up Concrete Inside of Buildings

By George Sixour, New York.

I have made a specialty of removing concrete walls, floors and foundations inside of buildings, using dynamite for the purpose.

The average general contractor is afraid to blast inside a building. It is probably just as well that he is if he hasn't an experienced blaster to do the work. But when properly done, a lot of time, labor and expense can be saved by blasting, for breaking concrete with sledges, drills and chisels is slow and costly work.

Possibly a description of a method I employed in blasting out a concrete wall under Foster's spring bed factory at Utica, N. Y., recently may prove of interest and value. The machinery was running and operatives at work all the time the blasting was in progress. An addition had been built to the factory 100′ x 80′. Shortly afterwards it became necessary to remove the old wall which was in the basement of the new building.

The wall was two feet thick. I put a crew of four men to work with sledges and drills, making bore holes at points indicated by myself. The holes were ten inches deep and four to six feet apart. Two or three ounces of dynamite was the load in each hole. Four holes were connected up in series and fired together with electric blasting caps.

The small shot gradually battered down the wall. Although necessarily slow, this process was much more rapid than would have been possible if we had attempted to break up the concrete with sledges. The labor cost was also smaller.

The New Austin Gasoline Shovel—Model 6-T

From the Austin Machinery Corporation, Railway Exchange building, Chicago, comes an important announcement of unusual interest to contractors. An event which they had long hoped for has come to pass —the perfection of a thorough-going, practical gasoline shovel—the new Austin Model 6-T.

This is in no sense a makeshift adaptation of the steam shovel idea, but an entirely new design, built "from the ground up" for gasoline operation.

Patented air-controlled clutches enable operators to manipulate the principal operations with ease, effectually removing the Austin 6-T from the hand-clutch, "man-killer" class. The cushion-drive clutches of swinging and crowding devices satisfactorily insure the necessary overlapping of operations. All operations may be quickly reversed at any time. The swinging machinery and hoisting drum are locked by means of automatic brakes when the power is shut off.

The increased earning power of the Austin 6-T Shovel is plainly apparent in the following exclusive features:

Ease of control (not a man-killer).
Overlapping of crowd, swing and hoist.
Three-lever digging control.
Cushion-drive swing and crowd.
Automatic locking of swing and hoist.
"Slam the dipper" door (a clean dipper).
Power boom hoist.
Quick replacement of clutch bands.
Interchangeable clutch parts.
Complete accessibility.

Fourth Edition of Lincoln Highway Log to be Out Next Spring—Book in National Demand

The Fourth Edition of the complete Official Road Guide of the Lincoln Highway, will be offered to the motoring public early in the spring of 1921. The work of compiling data for the new Guide has already been started at the offices of The Lincoln Highway Association here.

The Complete Official Road Guide of the Lincoln Highway is the only volume of the kind produced and is copy-written by The Lincoln Highway Association. It is a detailed log of the transcontinental road and gives in detail, all the information any tourist could require in making the cross country drive from New York to San Francisco, or reverse. The book is not only useful to tourists upon the Highway, but to thousands of others in all parts of the country as well, as it contains an adequate description of the historic and scenic attractions in the country traversed between the two coasts, and is profusely illustrated. It further carries an up-to-the-minute account of the developments and improvements of the Lincoln Highway, which has opened the way to the vast motor migration, especially to the natural playgrounds in the west.

The new Lincoln Highway Guide will be ready for distribution, it is hoped, by the first of April of next year, and will be on sale at hotels and garages along the Lincoln Highway and in book stores throughout the country, or can be had by mail direct from the offices of The Lincoln Highway Association, Detroit, Mich.

Hydrated Lime in Foundation Work

The city of Allentown, Pa., was confronted with high rentals or expensive land when a new public comfort station was needed near the center of town. Rather than meet the high prices or use a less central location, the city engineer decided to build under Center Square. The structure is 65 feet by 55 feet, projecting under the sidewalk to provide for stairways with covered entrances. The layout, as shown in the *Engineering News Record,* December 9, 1920, is a very compact and well arranged plan and merits careful consideration by those who are interested in such work.

Foundation Made Watertight

As it was essential that this structure be absolutely dampproof, hydrated lime was used in all the concrete exposed to moisture. A 1:2:4 concrete was used, the coarse aggregate being ¼ to ¾ inch crushed trap rock. Ten per cent by weight of hydrated lime was added to the cement used, and the result was an absolutely satisfactory watertight concrete. In addition to effectively waterproofing the concrete, the addition of hydrated lime also acted as a lubricant and insured a complete filling of the forms and a satisfactory finish.

H. F. Bascom, City Engineer, who designed the structure and supervised its construction, states: "The whole work was as pretty a piece of construction when forms were removed as one would want to see."

George H. Hardner, of Allentown, Pa., had the general contract for this work.

In writing about "Water Storage Tanks of Concrete" in the July, 1920, issue of the *American Fruit Grower,* Mr. Edwin K. Borchard says: "Many experienced concrete workers add one-tenth part hydrated lime to the other ingredients in mixing, as this tends to make the concrete more plastic, so that it will flow into the forms better and become more dense."

Comparative Costs of Small Houses for 1914, 1920 and 1921

At the national conference on the construction industries held at Philadelphia, Feb. 15-18, under the auspices of the Industrial Relations Committee of the Philadelphia Chamber of Commerce and the National Federation of Construction Industries, Mr. Daniel Crawford, Jr., an operative builder of Philadelphia, gave an interesting analysis of the cost of the general construction of a typical dwelling. According to his figures a 2-story house of 6 rooms and bath, built in Philadelphia, cost $2,969 in 1914, $8,346 in 1920 and could be built for $6,676 in 1921. These figures are based on an operation of 100 houses. Mr. Crawford's figures follow:

	1914	1920	1921
Ground	$ 500.00	$ 600.00	$ 600.00
STREET IMPROVEMENTS			
1. Sewer	$ 22.50	$ 60.00	$ 60.00
2. Water pipe	15.00	30.00	30.00
3. Curb (plain)	6.00	16.50	16.50
4. Cartway paving	25.00	90.57	90.57
	$ 68.50	$ 197.07	$ 197.07
GENERAL CONDITIONS			
	1914	1920	1921
1. Plans	$ 1.00	$ 2.00	$ 2.00
2. Survey	3.50	5.00	5.00
3. Building permits and affidavits	5.00	7.50	7.50
4. Water permit (brick and stone)	1.80	1.80	1.80
5. Electric service	....	....	....
6. Gas service	....	4.00	4.00
7. Fire insurance on building material	.10	.10	.10
8. Fire insurance on buildings	1.60	3.87	2.58
9. Plant and tools	5.00	15.00	12.00
10. Sales expense	64.00	176.00	144.00
11. Advertising	32.00	88.00	72.00
12. Office expense	29.40	78.60	65.50
13. Compensation insurance	....	7.93	6.80
14. Taxes	11.25	25.00	77.45
15. Interest	101.25	263.00	219.40
16. Title company's charges	69.75	150.25	123.75
17. Deed—acknowledging revenue and recording	4.00	8.50	5.00
18. Expense—placing first mortgage	20.00	220.00	108.00
19. Expense—placing second mortgage	23.00	278.00	125.00
20. Supervision	18.00	36.00	36.00
21. Supplies	5.00	15.00	12.00
	$ 395.65	$1,445.55	$1,036.18
CONSTRUCTION			
1. Excavation	$ 40.95	$ 99.45	$ 93.60
2. Stone masonry	145.54	408.70	354.42
3. Brick masonry	226.25	703.67	659.71
4. Rough carpentry	255.42	955.41	555.67
5. Finish carpentry	266.00	850.00	610.00
6. Plastering	104.61	385.04	269.42
7. Cement work	83.00	258.54	198.76
8. Cut stone	7.70	16.00	16.00
9. Structural steel	11.80	48.47	33.63
10. Roofing and spouting	50.00	120.00	110.00
11. Plumbing and gas fitting	167.00	545.00	442.00
12. Heating	166.00	440.00	368.00
13. Electric wiring	30.00	81.25	65.00
14. Stairwork	37.50	166.00	125.00
15. Labor—general	25.00	50.00	50.00
16. Tile work	5.50	12.00	9.90
17. Iron fence and clothes poles	17.00	30.00	25.00
18. Sheet metal work	35.00	105.00	85.00
19. Cabinet work	22.70	56.00	40.00
20. Hardware—finish	11.00	35.00	32.00
21. Hardware—rough	11.00	33.00	24.00
22. Painting and glazing	100.00	225.00	215.00
23. Art glass	8.75	15.00	15.00
24. Range and connection	21.50	65.00	65.00
25. Gas water heater and connection	12.00	35.00	26.00
26. Parquetry floor	48.60	143.75	129.60
27. Flue lining and crocks	2.10	8.85	8.85
28. Grading—general	3.15	6.65	6.30
29. Paperhanging and decorating	42.75	110.00	106.88
30. Lighting fixtures	44.25	90.00	85.00
31. Sodding and seeding	2.43	4.85	4.05
32. Numbering houses	.65	1.00	1.00
	$2,005.15	$6,103.64	$4,842.79
SUMMARY			
Ground	$ 500.00	$ 600.00	$ 600.00
Street improvements	68.50	197.07	197.07
General conditions	395.65	1,445.55	1,036.18
Construction	2,003.15	6,103.64	4,842.79
	$2,969.30	$8,346.26	$6,676.04
Sale price	3,200.00	8,800.00	7,200.00
First mortgage value	2,000.00	4,400.00	3,600.00
Second mortgage value	700.00	2,500.00	2,000.00

RATES FOR LABOR USED IN COMPILING ESTIMATES

	Per hour, 1914	Per hour, 1920	Per hour, 1921
Common labor	$0.17½	$0.50	$0.40
Carpenters	.40	1.12½	1.00
Carpenters' helpers	.20	.60	.50
Plasterers	.50	1.25	1.25
Plasterers' helpers	.35	1.10	1.10
Bricklayers	.50	1.30	1.30
Bricklayers' helpers	.35	1.10	1.10
Stone masons	.45	1.30	1.30
Painters	.40	1.00	1.00
Roofers	.40	1.10	1.10
Roofers' helpers	.25	.70	.85
Cement finishers	.50	1.00	1.00
Cement laborers	.20	.60	.60
Tile setters	.65	1.00	1.00
Tile setters' helpers	.40	.80	.68¾
Plumbers	.44	1.15	1.15
Plumbers' helpers	.20	.75	.75
Steamfitters	.36	1.10	1.10
Steamfitters' helpers	.24	.75	.75

COST OF MATERIAL

	1914	1920	1921
Foundation stone, per perch	$ 1.40	$ 4.00	$ 3.00
Bricks, per M	7.00	20.00	18.00
Cement, per bbl	1.55	5.25	2.63
Rough lumber, per M ft	20.00	70.00	46.00
Flooring, No. 1 spruce, per M ft	30.00	80.00	60.00
Lath, 4 in., per M ft	3.00	20.00	9.50
Builders' lime, per bu	.25	.70	.64
Calcine plaster, per bbl	2.00	6.25	6.25
Sand, per ton	1.30	2.96	2.30
Fibre, per bu	.25	.35	.35
Structural steel, per cwt	1.40	5.75	4.00
Tin, per box	8.20	22.00	22.50
Felt, per ton	30.00	110.00	85.00
Pitch, per cwt	.70	2.00	2.10
Nails, per keg	3.00	7.50	4.75
Sash cord, per hank	.55	1.25	.85
Tile floors, per sq. ft	.30	.1.00	.82½

SUB-CONTRACTS SHOWN BY PERCENTAGE OF INCREASE (ABOVE 1914)

	1914	1920	1921
Hardware (finish)	Unity	218	190
Plumbing	Unity	226	168
Heating	Unity	165	122
Painting	Unity	125	115
Paperhanging	Unity	157	150
Parquet floors	Unity	195	167
Roofing	Unity	140	120
Sheet metal work	Unity	200	150
Electric wiring	Unity	170	117
Millwork	Unity	215	121
Plastering	Unity	268	158
Gas ranges	Unity	200	200
Excavations	Unity	143	128
Rough stone foundation walls	Unity	208	170
Face stone work	Unity	126	90

Mr. Crawford comments on the above costs as follows:

In 1914 it was possible to buy small lots for dwelling house construction on 40-ft. streets for about $500. The price of the same lot today on a 50-ft. street is a little bit more. I say a 50-ft. street because there has been a general tendency in this community to develop on wider avenues, and the land has been laid out by the surveyors or engineers with a view of getting not less than a 50-ft. street, if possible, so that it is difficult today to find a piece of land that is divided up into 40-ft. streets. So that we have taken the same basic value, and merely added the land that is added, and made it $600 for 1920 and $600 for 1921.

The next item that enters into the cost of construction is utilities—the drainage, the water pipe, the curb, the paving—that the builder must pay for. In 1914 they cost him $68.50, and last year they cost him $197.07. This year the rates are the same. Some folks have said that we are going back to pre-war levels. The first important item that we find is the sales expense of 2 per cent, advertising 1 per cent, and office expense about 1 per cent. Generally, that is the total overhead charge of an operative builder. Four per cent represents his selling expense, his advertising and his office expense. The next item is taxes that amounted in 1914 to $11.25, $85 last year and $77.45 this year.

The next item is interest. You will notice that when a man starts in to build a hundred houses, it takes a lot of money. He must go to a trust company and negotiate a loan, and, of course, he must pay interest on that loan until he repays it to the trust company. We have predicated that charge on 9 months' interest on three-quarters of the cost of the house, the average operation taking anywhere from 15 to 18 months from the time it is started to the time it is dis-

posed of. The title company charges cover title insurance and guaranteeing against mechanics' liens, and searches, recording, and all that sort of thing, which, of course, are perfectly legitimate charges. The next large item is the expense of placing first mortgages. In 1914 we had no difficulty whatever in placing a mortgage of $2,000 on a $3,200 house at an expense of 1 per cent. People were glad to take those mortgages because they were a very good investment. In 1920 the conditions had reversed themselves very much. It was necessary to pay 5 per cent in most cases to place that mortgage, so that the cost of that item jumped from $20 to $220. That condition has been changed this year, and we can place mortgages now at 3 per cent, so that there is run into the expense of building that house a charge of $108. The next item is the expense for placing second mortgages. In 1914 most of the building and loan associations which took the mortgages were in funds, and there was no difficulty in placing that second mortgage by paying the charges of the attorney who represented that association, their solicitor, for drawing the papers, and looking after the settlement, a charge that generally amounted to $23. But the conditions of 1920 changed materially. It was necessary to pay 10 per cent in 1920 for placing second mortgage loans, and that amounted to $278. That has changed, and we can place them today at 5 per cent, so it is $128. Supervision and so on, is estimated at $18, $36 and $36. The general conditions in the construction of the average small dwelling house rose from $395 to $1,445, and now stands at $1,036.

Cement—A New Book

The new English book, *Cement,* by Bertram Blount, assisted by W. H. Woodcock and H. J. Gillett, is reviewed by S. G. S. Panisset in *British Chemical Industry* as follows:

This is a welcome addition to what may be described as the "popular" literature on cement. The author has to a large extent kept to the beaten track, which has led to similar books being stereotyped and uninteresting, but he has interspersed the inevitable historical quotations, descriptions of cement-making machinery, and extracts from standard specifications, with items of personal experience and predictions of the future trend of the industry that render the work under review of considerable interest and worth the while of even a cement manufacturer to read.

In the opinion of the author, the portland cement industry will develop on the lines of blast-furnace practice for burning, either by electrical heating or with oxygen-enriched air as a means of attaining the high temperature required, together with some undefined method of destroying the quality of toughness in the resultant clinker, and so enabling it to be ground with a fraction of the power now absorbed.

There is indeed much in the book that should cause the cement manufacturer of today to think, and it will be interesting to observe whether, with this suggestive work before him, the British cement maker will take the lead or will again be satisfied for other countries to be the pioneers.

It must be admitted that the British standard specification for portland cement in limiting the molecular ratio of lime to silica and alumina does not encourage progressiveness, and the first manufacturer to produce the fused clinker containing 70 per cent of lime, stipulated by the author, would probably be unable to market his cement as complying with the specification. The possibility of producing a cement of monocalcic composition is hardly touched upon, but the fortunate producer of such a cement would be similarly handicapped by the existing specification.

Strangely enough, no reference is made in the book to the British standard specification requirements in regard to chemical composition, nor is there a single chemical analysis of cement. There are numerous analyses of raw materials, but in many of the calcareous examples there is no separation of "silica and insoluble," even when this item exceeds 10 per cent, thus rendering such analyses of little value for the purpose in view.

Methods of analysis of raw materials and cement are given in considerable detail, but when it is stated that "rational" analysis of clay is unnecessary it must have been overlooked that unless clays liable to contain silt are submitted to some form of mechanical separation the chemical analysis will not be very useful for cement manufacture. Description of a method of "rapid lime determination," which is a prominent feature of works control, might have been included with advantage.

The valuable summary of the literature of the chemistry of cement shows the almost chaotic condition of this subject, and indicates the harvest that is to be reaped by the research workers of the future.

One wishes that the author, with his unique experience in the industry, had, to use his own phrase, put himself in the witness-box for a longer period, for his evidence would have been more appreciated than the lengthy extracts from foreign cement specifications and other matter, such as the methods of oil testing and the history of the forms of briquettes.

Concrete Oil Tank Conserves Ground Space

By WM. DUNBAR, Treasurer,

The Bedford China Company, Bedford, Ohio.

A good example of how a concrete oil storage tank conserves ground space is the tank recently built for us by the William Dunbar Company of Cleveland, O. This was a tank 23 ft. wide by 53 ft. long, and 5 ft. 2 in. deep inside. It is built to hold 30,000 gallons of heavy fuel oil. The walls are 14 in. thick at the bottom, tapering to 8 in. thick at the top. A dividing wall runs through the center of the tank, making two separate tanks in one.

The roof for the tank was made of concrete, and like the other parts of the tank, was thoroughly reinforced with steel rods. The interesting feature here is that this rof was used as he floor of one of the regular buildings of the Bedford China Company. The concrete wall are the walls of the oil tank upon which a one-story brick building was erected and is now being used as our sagger shop. In other words, the basement of this building serves as an oil storage tank.

Two openings were left in the top slab so that the tanks could be cleaned when necessary. We are very well pleased with this construction, inasmuch as we were able to utilize the space above the tank to the best possible advantage without having even to provide a new flor for our shop.

The tank was tested with water after it was constructed and after many days showed absolutely no signs of leakage; and actual measurements showed no change in the height of water. No cement hardener or water-proofing was used.

The Care of Concrete Mixers

If contractors would give their mixers the little attention that they require, they would last much longer. In most cases the operators are fully responsible for the upkeep of the machines and are never called to task because the mixer is in run down condition. If the contractors themselves or a responsible foreman would see to it that their mixers were properly greased, oiled, cleaned, etc., there is no doubt that the mixer's life and efficiency would be materially increased.

Many building contractors do look after their mixers and their machines reflect this care in their operation. However, workmen usually leave their mixer just as they finish with it. Only recently the writer saw two workmen one morning pounding the loading skip with sledge hammers, trying to clean it out, because they had neglected to wash it out the previous evening. Imagine the mixer going through this pounding process every morning and possibly more frequently. No wonder the mixer lasts only a short time and needs to be replaced.

The following suggestions for taking care of building mixers are intended as an aid to those contractors who do not but should give their mixers careful attention. If followed carefully, good results will be noticeable in the looks and operation of the mixer.

Setting Up

When you buy a new mixer, see that it is assembled correctly before starting. Turn down the grease cups, oil the wearing surfaces where necessary, see that the bolts and nuts are tight and be sure everything is alright, then go ahead. Manufacturers always send instructions for setting up, which should be your guide when assembling.

Oiling

Oil your machine liberally. Give the drum rollers plenty of grease; they have the heaviest duty. Don't forget your engine, either; it needs oil. Follow the engine oiling instructions carefully. Oil the drive chains to make them drive smoothly and endure. Oil all gears, especially bevel gears. Use a good quality of machine oil that will not thicken when cold. Also use a good grade cup grease where grease is required.

Feeding

It has been found that as far as mixing is concerned, it does not matter in what order materials are fed into the drum. The feeding is done to meet the convenience of the operator. If desired the old method of hand mixing can be adopted as follows: Sand and cement, then add water and follow with crushed rock or gravel. A good way to get cement in without "dusting" is to put it into a barrow of sand, or still better, to add some water to the batch before putting in the cement.

Where a sharp stone is used in the batch, it is well to put in a portion or all the sand first, as the sand will act as a cushion and protect the shell of the drum.

Do not fill the drum too full. A big batch mixes more slowly than a small one. There is a happy medium between best time per batch and best quality, which experiment will determine. Cement Mortar or "Sloppy" concrete is best mixed in batches of reduced size.

Washing

Wash out the drum before the mixer is stopped. It is necessary to keep the inside of the drum clean, as only a clean drum will do good work. Fill the drum with water and revolve until it is clean, then discharge the water. If water alone does not clean drum, add a little crushed stone, or a few small pieces of scrap iron.

If the drug is once neglected and cement allowed to harden inside, it is very difficult to clean.

Blocking

It is sometimes desirable to block mixtures. Do this whenever possible. It not only prevents destructive vibration but saves power and repair bills.

Care of Boiler

If you have a steam driven mixer, follow these instructions carefully. Do not fire hard when the boiler is cold. The type of vertical boiler best adapted to concrete mixers has one weak point, viz., the top end of the flues are not surrounded by water. In raising steam, the fire should not be crowded until some pressure is shown on the gauge, or the top of the tubes will be overheated and the boiler will surely leak.

A boiler is really a sensitive apparatus and requires as much or more attention than the engine.

Repairs

Keep your mixer repaired. Don't allow parts to be worn so they effect the operation of the mixer. The minute you notice a worn part order a new one. It will pay you every time. Particularly watch your drum rollers. Replace them as soon as they are worn or become wabbly. Never allow your drum to run untrue. Watch every part and replace it with new one as required.

Ordering Repairs

Always keep the repair lists which the manufacturer furnishes. Order your parts by numbers or according to the factory instructions. You would be surprised how much time it will save and the sooner you get the replacement part on your mixer the better for the mixer.

These simple rules, if followed carefully, will apply to any make of mixer. As a rule manufacturers furnish instruction books which go into detail on each item, but if contractors will follow the above rules and use their own judgment about oiling, loading, and taking care of their mixer, they will find that their mixer will give them better service and last much longer.

Studies on Cracking of Stucco

Continuing his long series of tests into the nature of stucco, J. C. Pearson, of the United States Bureau of Standards, reported on a new set of tests in a paper entitled, "Shrinkage of Portland Cement Mortar and Its Importance in Stucco Construction," which he read before the recent meeting of the American Concrete Institute. By means of a very accurate microscopic instrument, called the "comparatar," by which could be measured the minute variations in an established base line on a small piece of concrete from the beginning of its setting until final set, the expansion and contraction of a concrete mortar during the setting period was measured for a number of different mixtures. It was found with water-tight forms that while occasionally there was an initial expansion, there was as a rule a continuous contraction from the beginning almost as soon as the concrete was placed and continuing in a minor degree for some months. Such a contraction would in a stucco wall, of course, result in map crazing. The investigators, therefore, decided that the tightness of the forms had something to do with this pronounced contraction and made a number of tests with plaster of paris forms which permit a certain amount of absorption of the water in the concrete. When these bases are dry their absorption is high, but this can be controlled by wetting with measured quantities of water prior to filling the forms. It was established that this absorption or "suction," as the plasterer would call it, had a very great effect upon the time of set or stiffening of the mortar. If mortar was placed

in a form with a dry base set occurred almost before the plugs could be placed in position and initial readings taken. Slight wetting of the plaster bases deferred this set until earlier readings were taken, say from 15 to 20 minutes, and heavier wetting deferred the set still longer. Correspondingly, the amount of contraction was reduced so that a measure, not yet complete or accurate on account of the limitations of the tests, was reached which tended to establish the proper amount of moisture at the base of the form for proper stuccoing.

Concrete Mile Posts to Mark Illinois' Roads

Concrete mileage posts surmounted by Illinois-shaped concrete markers, which together will stand six feet tall, are to be placed this winter or early in the spring at all crossroads upon the three state-aid highways which have been hard surfaced this year, according to announcement of S. E. Bradt, state superintendent of highways.

Roads upon which these markers will be placed first are the Dixie Highway, running from Chicago due south through Danville to Lawrenceville; the Lincoln highway, which runs across state from Chicago through Dixon to Fulton, and the highway between Peoria and Springfield.

Five thousand markers, at least, will be ordered. There will be a total eventually of 5,000 or more miles of hard-surfaced state roads, and it is figured that at least one marker a mile will be necessary.

The markers will be made to withstand the wear of time. They will be entirely of concrete. The post will bear in large black letters the number of miles to the next city or division point. Just above this mileage figure, within the black outlined Illinois, which will measure about one foot by two feet, will be the number of the route. Each main road in the state system will have a route number. Below the route number will be the letter "L" or "R" to indicate a right or left turn.

Marking of the highways was originally planned to be done by the road builders. This method, the highway superintendent says, presented such difficulties that all marker sections of contracts have been rescinded, and all markers will be made by one factory.

Contracts have not been let yet, but models have been submitted by several manufacturers. It is expected that bids will be asked soon.

Wrecking an Old Stone Building

By M. C. POTTER, Iowa

Much time, labor and expense can be saved by using dynamite to demolish old stone buildings. Various methods may be employed. The location of the building will govern the selection of the best method; that is, a building standing away off by itself can be given rougher and quicker treatment than one standing near other buildings that would be damaged by flying stone or debris.

Assuming that the building stands in an isolated position; I would proceed to put down bore holes all around the outside of the foundation walls spacing them 3 to 4 feet apart and going down into the ground approximately 4 feet. The holes should be so placed as to make it possible to get the charges of dynamite right up against the foundation walls.

A half or a quarter pound charge of dynamite should first be set off in the bottom of each of these bore holes for the purpose of forming a cavity into which five to ten pounds of dynamite can be loaded. The preliminary charges need not be tamped in. The larger finshing charges should be tightly tamped. An electric blasting cap should be imbedded in one of the cartridges going into each charge.

Then going inside the building, place a 25 or 50 pound box of dynamite in each corner of the cellar right up against the walls. The size of the charge, of course, depends upon the thickness of the walls and the size of the house. It is only necessary to remove from the box the one cartridge in which the electric blasting cap is inserted. After the cartridge has been primed, it can be placed back in the box in its original position. Each of these corner charges should then be covered with moist earth to a depth of about 2 feet well packed down over the charge.

Similar charges can be placed on the first floor of the house in the corners, covered with earth in the same way.

Most old stone houses have open fireplaces. These, as a rule, are of most substantial masonry construction. It will be found effective to place a box of dynamite in each fireplace, covering it with moist earth in the same way as described above.

After all charges have been located, all charges should be connected up together in series by means of electric blasting cap wires and pieces of copper connecting wire. Great care should be exercised that there are no breaks in the circuit and that every charge throughout the inside and outside of the building are included in the circuit.

The open ends of the circuit are connected to Duplex leading wire which should be at least 500 feet long extending to a blasting machine that should be located in a sheltered place from which the blaster may operate safely. When all is in readiness, the blasting machine can be operated.

As a general rule, the result of a shot of the type described will be the complete collapse of the building. Most of the stone will be found in a heap in what had been the cellar with the roof lying on top of the pile.

If it is desired to save the roof timber, it will be best to remove it before the blasting as it usually becomes splintered and broken by the fall and by having pieces of stone shot through it.

The stone itself is seldom injured. Of course, some of the stones coming in direct contact with the blasts will be broken into smaller pieces, but nearly all of the stone can be again used for rebuilding.

If a building stands so near to other structures that this method cannot be employed, it is desirable first to remove the roof. Then beginning at the top of the structure, drill holes into the mortar between rocks and tamp into these holes small charges of dynamite. From an eighth to a quarter of a pound of dynamite in each hole is usually a proper charge. However, that depends upon how near the contiguous buildings may be. The further away, the larger the charges that may be used.

Before firing these charges, it is usually well to cover them with blasting mats made either of heavy rope, or of homemade construction consisting in binding together in some way a number of burlap bags which should be saturated with water to make them as heavy as possible. This will prevent pieces of rock from flying and breaking windows or damaging roofs of nearby buildings.

Whichever method is employed, a great deal of time and labor can be saved by the employment of dynamite.

Getting the Maximum Service in Rubber Transmission Belting

Strive for High Coefficient of Friction, Large Arc of Contact, Proper Initial Tension—Avoid Excessive Tension, Reckless Use of Dressings, Careless Fastenings

By JAMES B. McPHERSON
B. F. Goodrich Rubber Co.

Most of the trouble experienced by users of transmission belt is entirely unnecessary, and is usually the result of trying to put a square peg in a round hole. The selection of type and ply if often left to guesswork, and the result is premature wearing out of the belt.

Extreme care should be exercised in the choosing of a belt, and a few simple fundamental principles should be followed. Much has been written on the subject, and yet experience shows that these lessons must be repeated and rewritten. Every new belt means expense, and in fairness to themselves, belt users should know how to get the maximum life and work out of any belt.

The ability of a belt to transmit power depends upon the grip of the belt upon the pulley. This grip is dependent upon the friction between the materials of which the belt and pulley are constructed. When the coefficient of friction is low, the result is excessive slip. The coefficient of friction for rubber on iron is approximately 0.25; of rubber on rubber, 0.35. When the coefficient of friction is low and there is excessive slip, common practice is to increase the tension. But this is bad practice; lagging the pulleys with rubber will increase the grip of the belt on the pulley and eliminate much of the slip.

Arc of Contact

The arc of contact is of equal importance to the coefficient of friction as a factor affecting the grip of a belt on the pulley. The greater the arc of contact, the greater the grip. It is evident that the arc of contact should be as large as possible in order to secure a larger gripping surface on the pulleys. In order to secure this greater arc of contact, the use of snub pulleys is sometimes necessary.

The snub pulley should be applied at the proper point to hold the belt against the pulley over a greater arc, and on the pulley that has the smaller arc of contact. But the snub pulley, like chains on a tire, is a means of overcoming a deficiency that cannot otherwise be conquered. It is a substitute for a properly-designed installation with the proper arc and with a belt of sufficient width to carry the load. It usually makes necessary an endless belt and sets up additional internal stresses. It is far more desirable to have the drive designed so as to give the best arc of contact, or, this being impossible, of sufficient width to procure a maximum gripping surface.

Initial Tension

The initial tension that is applied is allied to coefficient of friction and of arc of contact as affecting the power that can be transmitted. Without entering into the technical relations and values of tension, it will suffice to say that, were there no initial tension, there would be no grip of the belt upon the pulleys. Going to the opposite extreme, tension could be applied until either the belt breaks or the pulley shaft springs. Somewhere between the two is the ideal tension for properly transmitting the necessary power, which good rubber belt practice has demonstrated to be about 10 lbs. per ply per inch of width.

Excessive tension leads to undue strain upon the belt, thus shortening its life in service. It also leads to excessive journal friction and overheated bearings. Not only is actual damage done, but the added power necessary to merely turn the driving and the driven shafts under this excessive pressure is wasted. When the belt is in operation the tension on the tight side naturally increases to the extent of the power transmitted (effective pull or horsepower tension), plus the initial tension. The total tension is equal to the initial tension plus the horsepower tension. Total tension should not exceed 20 lbs. per inch of width per ply for ideal conditions.

Factors in Proper Transmission

Summing up these three points then, for ideal power transmitting conditions we must secure (a) the maximum coefficient of friction, (b) the maximum arc of contact practicable, and (c) the proper initial tension. These can be obtained, briefly, (a) by lagging the pulleys, (b) by the use of snub pulleys if absolutely necessary, or installing the belt with the tight side on the bottom of the drive (in which position the natural sag then increases the arc of contact rather than decreasing it), and (c) by applying an initial tension not to exceed about 10 lbs. per ply per inch of width.

The maximum speed for effective operation is about 5,000 ft. per min.; greater speeds than this produce a centrifugal effect which impairs the grip of the belt upon the pulleys. The face of the pulleys should be about 2 ins. wider than the width of the belt. The best center to center distance for drive belts is from 20 to 25 ft., on horizontal drives. Vertical drives are to be avoided, because of the high initial tension necessary to hold the belt in contact with the lower pulley; where vertical drives are unavoidable, the centers should be as short as possible.

Rubber Belt Troubles

The most common causes of rubber belt troubles are the practice of blindly increasing the tension until the bearings groan, or smearing on belt dressing of unknown ingredients, many of which are injurious to rubber belts, or using belts that are too heavy or wide for the pulleys. Carelessness in fastening frequently ruins belts, especially where rawhide lacings are used; the ends should be square and lacing tension should be even across the belt. Running the belt on "cross cones" will curl the edge of a belt, stretch it along one side, and separate the plies. The edge should never rub against the next step of a cone pulley or anything else.

We may now consider some factors which affect the belt, but which are principally matters of machine design. Normally a belt manufacturer must recommend a belt to fit conditions that already exist; as for example, the pulleys are already installed, the speed must be a certain rate, and the horsepower to be transmitted is fixed. Machine designers, knowing these

conditions, should know the number of plies necessary to do the work and should allow 4 ins. of pulley diameter for each ply of transmission belt. Continuous bending of a heavy belt over a pulley that is too small sets up within the belt excessive strains and internal friction that were not considered in their design. But knowing the conditions that exist, the belt user should be able to prescribe the belt best suited to those conditions.

Belt Formulae

At this point, we will consider a few simple formulae. We recognize that the power transmitted by any belt depends on the working tension and the velocity at which the belt moves. We recognize that the working tension is limited by the strength of the belt in tension, and this, in turn, depends on the width and thickness. It is logical to expect then that a certain size belt running at a certain speed can transmit a definite amount of power.

Experience has demonstrated that the following rule checks up with good average practice: "A four-ply belt 1 in. wide, running at 800 ft. per min., can transmit 1 hp." Using this rule as a basis, we can by direct proportion determine the horsepower that any other belt will transmit, or the proper number of plies, or the width, if we know the horsepower to be transmitted and the speed of the belt.

The following formulae are deduced from good average practice; they will be found useful to the practical man and are stated without going into their derivation, which would add needlessly to the length and complexity of this article.

The maximum tension in a belt is found by multiplying the horsepower by a constant. This constant varies with the conditions. The results of the formula will be in pounds.

T max.$=600\times$Hp., for bare pulleys.
T max.$=400\times$Hp., for lagged pulleys.
T max.$=400\times$Hp., for tandem pulleys.
T max.$=330\times$Hp., for lagged tandem pulleys.

The following formulae will probably answer any question that may be raised about any drive and will enable a user to determine if his belts are properly selected; they are particularly handy because of the ease with which they can be juggled to obtain any factor:

Where Hp. = Horsepower.
P = Plies.
W = Width of belt.
D = Diameter of either pulley in ins.
N = R. p. m. of the above pulley.

$$\text{Hp.} = \frac{\text{PWDN}}{12{,}000}$$

and

$$\text{P} = \frac{12{,}000\ \text{Hp.}}{\text{WDN}}$$

and

$$\text{W} = \frac{12{,}000\ \text{Hp.}}{\text{PDN}}$$

Special drives, such as crossed drives and quarter or half-turn drives, involve special principles, which will not be considered here.

Care in Lacing

Presuming now that the proper belt has been chosen for a given drive, the next feature to be considered is lacing. Great care should be taken that fasteners are chosen that will grip the warp threads rather than cut through them and weaken the belt. After all, a belt is only as strong as its weakest point. That point is at the joint. It is safe to say that no laced belt will show a tensile strength equal to 75% of the tensile strength of the belt itself. That fasteners are successfully used is due to the fact that belts are operated with a large safety factor and the fastener is never called upon to exert a tensile strength equal to that of the belt.

Great care should be taken that mineral oil does not come in contact with rubber belts. Its action is injurious. It should also be remembered that a rubber belt is about the only thing in life that should show the seamy side! We usually try to hide the seamy side, but don't do it with a rubber belt! The smooth side should be run next to the pulleys.

Novel Method of Stopping Overflow in Cesspool

By Will Foote, Maryland.

On the grounds of the suburban residence of a Mr. Winterson near Annapolis, Maryland, was a cesspool 8′ x 8′ x 8′ that frequently filled to the top and overflowed, saturating contiguous ground on one side.

It was walled up with dry placed stone to within two feet of the surface of the ground. It was located at the head of a slope. One hundred feet down the hill, the surface of the ground was lower than the bottom of the cesspool.

It was decided to try stopping the overflow by making the soil more open or absorbent. This was accomplished by a method new to this locality. I will describe it.

A row of two inch bore holes, twelve in number and ten feet deep and six feet apart, was put down leading away from the cesspool in the direction of the low ground.

Each hole was loaded with a pound of forty per cent ammonia dynamite, thoroughly tamped; holes connected up in series and fired with electric blasting caps.

The theory was that the blasts would break up the hard soil, make it more absobent and that the liquids in the cesspool would sink into the ground rapidly enough to avoid any overflow at the top.

The work was done in February. Two days afterwards, the level of the fluid mass in the pool had gone down four feet, and notwithstanding it has been in continuous use since, it has not risen above that level to date—October 15th.

The total cost of the job was $24.50. Two men did the work in four hours.

Zinc Oxide in the Paint Pigment

Property owners can improve the appearance of homes and other buildings by demanding the use of from 30 to 50 per cent of zinc oxide in the paint pigment. This material increases the life of both exterior and interior coatings, insures lasting lustre and prevents fading. Paint which includes the proper proportion of zinc in the pigment mixture better finds its way into the pores of the surface, and thus affords excellent protection against deterioration.

Modified Vicat Apparatus for Study of Setting Time of Cement

By O. L. Moore
Chief Cement Inspector, Universal Portland Cement Company

For a closer study of the setting properties of Portland cement than is usually necessary in commercial testing it is desirable to have a series of readings taken at short-time intervals while the cement is setting. Such data may be studied as setting-time curves and in investigational work have an advantage over the usual initial and final setting-time data.

In order to obtain data of this nature relative to the effect of temperature, humidity, personal equation, etc., on our inter-laboratory test results we remodelled an old Vicat apparatus, shown in the accompanying cut. After some experimentation and changes in the apparatus quite consistent results are obtained, and we have been enabled to develop some interesting and instructive data in connection with the setting of cement. The principle consists in balancing the rod and needle by means of a beam and weight and determining the load necessary at time intervals to cause the needle to penetrate definite distance into the neat paste.

The paste, prepared according to the standard methods of the American Society for Testing Materials in a Vicat mold, is placed on the platform, the needle brought in contact with the surface and the stop set for a ¾-in. penetration. Shot or preferably weights are added to the pan until the needle is brought to rest by the stop. The time and load is then recorded and the specimen returned to the moist cabinet until another reading is desired. Short penetrations give smoother curves than deep penetrations. For normally setting cement hourly readings are sufficient. The load may be applied in units of 50 gr. for plotting on small scales, and reaches the strength limit of the ordinary length of Vicat needle at about seven kilograms.

The accompanying charts have been selected as typical setting-time curves. They give some idea of the consistency of the data and the results which may be obtained with a little experience.

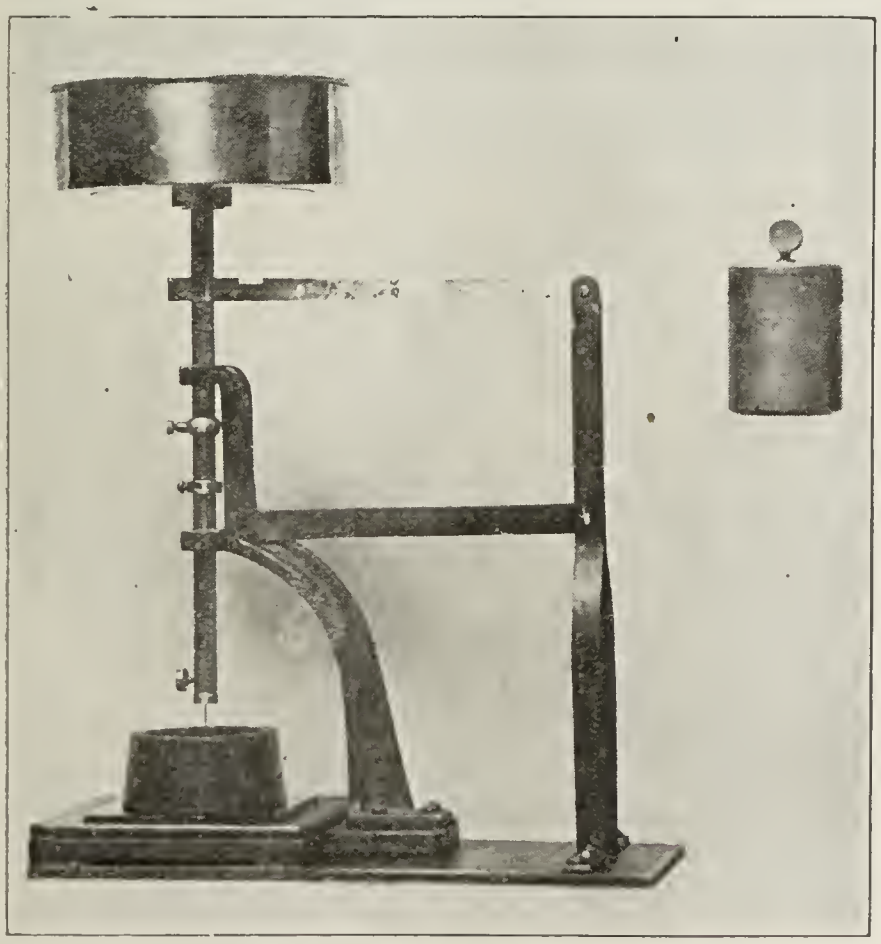


Fig. 1. Setting-time apparatus

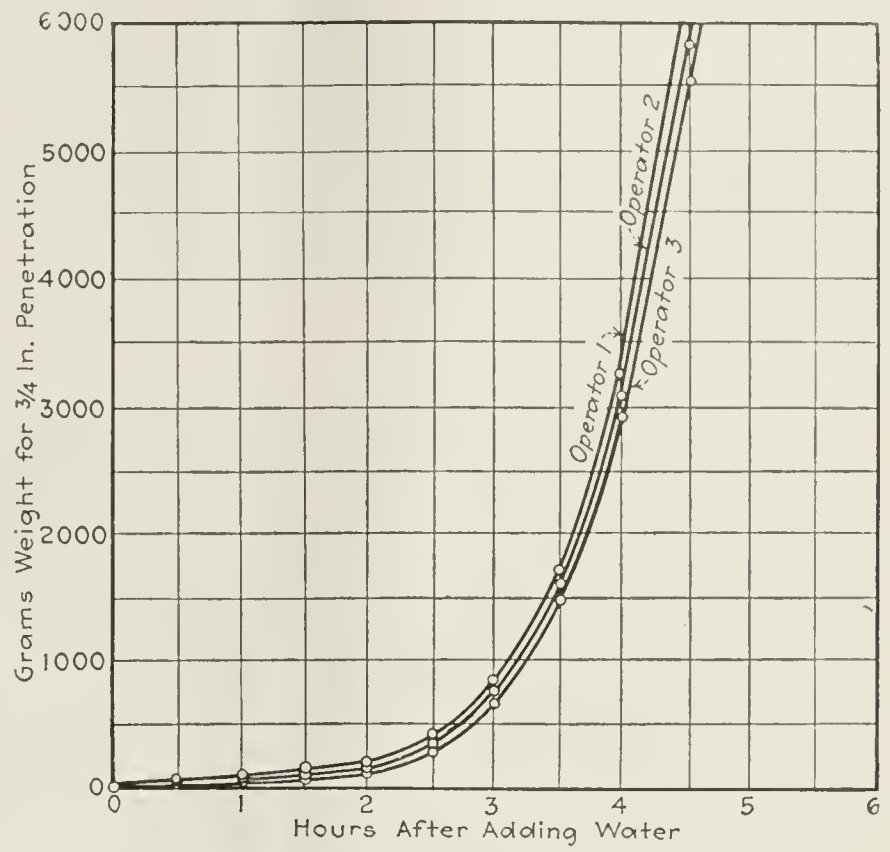


Fig. 2. Effect of personal equation on setting time Ready for work

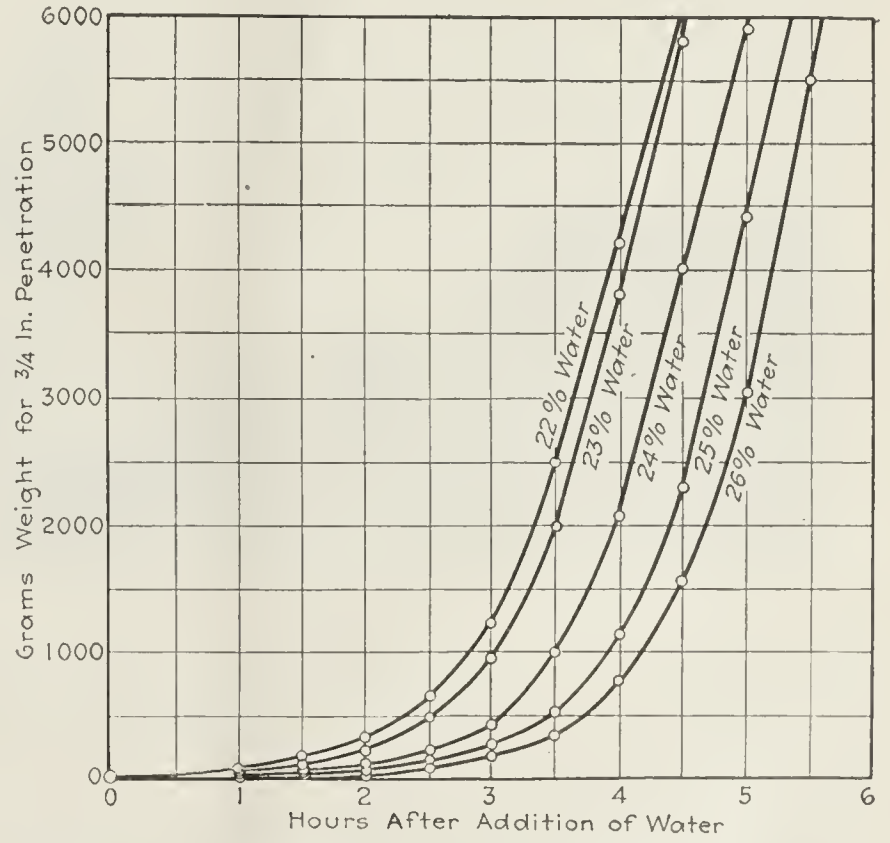


Fig. 3. Added per cent of water increases setting time

Floor Tile of Concrete

The National Mosaic Tile Co., Mobile, Ala., state that they are in position to fill large orders for Adamantile, a floor tile of excellent quality. The tile are made under hydraulic pressure and supplied in various colors and designs. The company stated that they will coloperate with other products manufacturers and will furnish Adamantile to contractors and products manufacturers for re-

Work of Cranes in Handling Sand and Crushed Stone

Handle heavy commodities with a crane. This advice is good provided there are sufficient of the commodities to keep the crane fairly busy, which generally is true at point of production and at large yards where material is handled in quantity. This was the case with the Superior Sand & Gravel Co., Detroit, Mich., which put in a Link-Belt crane to handle the sand and gravel, of which it makes a specialty. C. E. McCausland, general superintendent for the company, has this to say with respect to the service given by the locomotive crane:

"In order to keep up to schedule on our daily deliveries of sand, gravel and crushed stone, amounting to hundreds of tons, we had to find what to our mind would most efficiently load the motor truck. By trial this proved to be Link-Belt Co. locomotive cranes which do the work.

"With two Link-Belt cranes, equipped with grab buckets, we keep our five loading hoppers filled with sand, gravel, etc. The hoppers are elevated about 10 ft. off the ground, each hopper holding 150 tons. With the two cranes we load a hopper in 30 minutes.

"Our motor trucks, a fleet of 3, 5 and 6 tonners, draw up under the hopper and are loaded in 1½ minutes, and are off on the job again delivering the material. In emergencies, we can load the trucks direct with the cranes, 4 or 5 minutes being required to load a 6-ton truck.

"Without our two cranes, a loading gang of fully 100 men would be necessary, and even then 10 or 15 minutes would be required to load a single truck, thus taking seven or eight times as long as it now does."

Large-Scale Gravity Storing and Handling for Road Materials

The W. Z. Williams Company, Macon, Ga., is now building 6½ miles of concrete highway in Bibb County, Georgia, with an equipment carefully designed to reduce to almost nothing the labor of handling the concrete materials.

Cement, broken stone and sand are delivered by the railroads to a spur of the Macon and Birmingham Railroad that crosses at right angles the high way under construction near its center point. The spur is run over a long trestle built of timber and containing, under the standard-gage track, a 4,000-ton storage bin 540 feet long into which the standard-gage 12-yard dump cars and gondolas in which the aggregate is received are dumped, as hauled by the locomotives.

Close to the trestle and adjacent to another spur of the railroad is a cement storage house about 250 feet long.

A 24-inch-gage service track runs under the trestle bin from end to end, passes close to and parallel with the cement house and is continued a short distance to the highway, where it branches in both directions and is extended to the ends of the construction work. On this service track there are installed 42 Western road-builders' trucks, each equipped with two Western steel batch boxes of 1-yard capacity. The trains of cars and batch boxes are run under the storage bin, from which they are filled by gravity, cement bags are emptied into them from the loading platform at a lower level as they pass the cement house, and they are hauled by three Whitcomb gasoline geared locomotives to the mixer, where the batch boxes are un-

loaded as required by a standard crane attachment, which dumps the contents into the mixer skip.

Each gasoline locomotive hauls a train of 10 to 13 cars of concrete materials to the mixer, and the use of the batch boxes and car delivery is estimated to save the labor of 20 wheelbarrow men at the mixing machine.

Besides the equipment enumerated, there is a four-bag mixer, a large concrete road paver, a subgrader, an Austin "Giant" road grader, an Austin road roller, a service car, steel forms and the usual equipment of wheel and drag scrapers and plows.

The contractors were fortunate in being able to locate a site with topography favorable to the installation of this plant, and in being able to build the storage bin so that most of the material could be salvaged after the completion of the job, and so that the bin planks could be sawed in a local mill already installed in the vicinity by the contractor.

Construction Features of Pumps Manufactured By Kansas City Hay Press Co.

For the past 25 years the Kansas City Hay Press Co., has been a large manufacturer of centrifugal pumps for both water and sand. These pumps are provided with a runner with sides cast on it, and thus the material is retained until it reaches the proper place for discharge. Each shaft is made with reversible ends so if it is discovered that one end is cutting or wearing, the ends may simply be reversed and by this means long delays avoided and much money saved which would otherwise be necessary for repairs.

The sides of the pump are separate from the shell and can be ordered separate at any time for repairing the pump. Also the shell is a separate part and can be replaced without replacing the sides.

There is also a special brass sleeve that transfers the sand along with the stream of water which plays in the brass sleeve and prevents the sand getting into the stuffing box. There is very little wear on the shaft by the action of the sand. The company supplies two sets of ball bearings with each sand pump to take the end thrust.

Each pump is supplied with a set of threaded flanges so as to enable the buyer to attach his pipes to the pump. These flanges are bolted to the pump so the operator has no bolts or flanges to buy. The holes in the flanges match with those in the pump, thus saving the trouble and expense of having this done where flanges must be purchased extra.

The pumps are so constructed that the operator is able to get any angle of discharge he desires. All pumps are built right-hand, but if a left-hand pump is desired very little change is necessary and no special delay will ensue if the operator has a right-hand pump and desires to change it to a left-hand. These pumps can be used on boats or on frame work along the stream.

All of the pumps are made of the best material and great care is taken in the workmanship that they shall be perfect in construction. They are also made very heavy so as to stand a great deal of water.

Suction and discharge pipes are made the same size and the inside of the pump is constructed to carry the full volume of water brought into it by the suction pipe.

Pumps for water only are made on the same general plans used in building heavy water and sand pumps, and the same careful attention is given to putting these pumps together as shown in the heavier and higher grade dredging pumps which are well known to the general trade.

In the water pump the company furnishes a first-class centrifugal pump, without in any way destroying the utility or decreasing the capacity of the work it is recommended for.

Persons who desire to put in an irrigation plant of a limited capacity at a moderate expense will find that by using one of these smaller sized water pumps they will be able to handle a large volume of water where the combined lift and discharge does not exceed 20 or 30 ft.

Hoffman Venting Valves

There is no question but that the well informed builder, contractor, architect, engineer and steam-fitter will acknowledge that the heat service obtainable from a steam heating apparatus is largely dependent upon the proper operation of the air valve with which the apparatus is equipped. The air valve selected should, therefore, be so designed and constructed that it will, without thought or attention of the user, automatically free the radiator to which it is attached of all air without the slightest steam or water leakage. Such valves insure flexibility and economy of operation while air valves requiring adjustment are sure to sooner or later become leaky and inoperative and are always inimical to economy and efficiency (their use often resulting in damaged floors, walls and ceilings).

It has, however, in the past, been customary to accept the troublesome air valve as an inherent defect of steam heating apparatus and treat the thought of an air valve that was automatic without adjustment and would not leak steam or water as a dream too idealistic to become true.

Seven years ago, Mr. George D. Hoffman, the designer and patentee of all the Hoffman Venting Valves, contending that the "perfect" air valve was a possibility, placed on the market the No. 1 Hoffman Siphon Air Valve and claimed that it was absolutely automatic, absolutely non-adjustable, and that it would completely and fully perform its functions without steam or water leakage. This claim was backed by a guarantee of five years' satisfactory service or money back. It was a hard fight to make the trade realize that the long-hoped-for air vavle had arrived, but the fact that two millions of these valves have been sold during the past seven years, and that less than One-Tenth of One Percent of all valves sold have been returned for any cause, should be acceptable evidence to the most skeptical that No. 1 Hoffman Siphon Air Valve has a virtue distinctly its own.

But in spite of the fact that No. 1 Hoffman Siphon Air Valve fully met the need in its particular field, its use was limited to low pressure gravity steam heating systems. The success of the No. 1, however, naturally created a demand for a Hoffman Valve for other venting service and from time to time such other valves have been added to the line, until Hoffman Valves now form a complete line of venting valves with "A Venting Valve for Every Service."

The Hoffman Specialty Co., Waterbury, Conn., and 130 N. Wells street, Chicago, Ill., has prepared a catalog presenting in an attractive explanatory form the various types of Hoffman Venting Valves now in use.

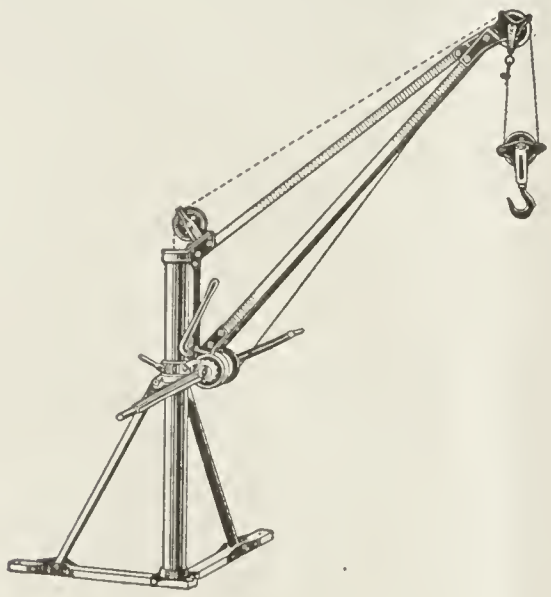
Builders' Derricks and Winches

Winches and derricks are most important parts of a contractor's equipment. They will often pay for themselves in the time and labor saved in handling material, both light and heavy, on the job.

The winch shown here is especially convenient and practical in construction work. This single drum, single shaft geared winch can be operated both direct and in gear from one shaft. The change from direct to compound can be made in an instant by one small

lever. When light loads are being handled, the direct drive can be used with the resulting speed. When heavier loads are being handled, the gear drive should be used.

The other illustration shows the "Champion" all-steel derrick. This is light and portable and at the same time is capable of handling 1,000 pounds. It folds up into two pieces so that it can be readily carried in an auto.



The Sasgen Derrick Company are the makers of this equipment. Further particulars on their new winch and other types of equipment can be secured from Cement & Engineering News, 22 Quincy St., Chicago, who will gladly send you their catalog giving instructions and prices.

Book Reviews

Concrete Work, Volume I—A Book to Aid the Self-Developing of Workers in Concrete and for Students in Engineering. By William Kendrick Hatt, professor of civil engineering, Purdue University, and Walter C. Voss, head of Department of Architectural Construction, Wentworth Institute, 451 pps., 244 figures and plates. John Wiley & Sons, New York. 1921. $4 net.

This volume is the first of a series of industrial texts edited by W. H. Timbie, associate professor of electrical engineering, Massachusetts Institute of Technology, from the material and experience of the Committee on Education and Special Training of the War Department, under whose direction was conducted the successful training of 130,000 soldiers in various vocations and trades in 147 different schools during the war period. The authors were both intimately connected with this work, Professor Hatt having planned and supervised the army training in concrete construction, while Mr. Voss had immediate charge throughout the war of the training given in this subject at the Wentworth Institute.

The primary purpose of the work is clearly set forth as follows: "The purpose of these volumes is to extend the scope of work now possible to the concrete worker of unguided experience by bringing him to an intelligent understanding of the scientific principles underlying his art and by introducing him to the wider opportunities that exist for him in concrete construction "and in this purpose it is believed that the authors have been successful. For such a book there is a very evident place but its field of usefulness is by no means limited to that place alone.

Chapter headings are as follows: 1. Opportunities in the Concrete Industry. 2. Plans, Details and Specifications. 3. Simple Footings. 4. Column Footings. 5. Concrete Walls 6. Reinforced Concrete Frame. 7. Erection of Reinforced Concrete. 8. Pre-Cast Stone. 9. Walls and Partitions. 10. Concrete Walls and Paving. 11. Building Finish. 12. Special Concrete Construction. 13. Estimating.

Appendixes covering 90 pages are as follows: A—Aggregates, B—Manufacture of Cement, C—Standard Specifications and Tests for Portland Cement, D—Suggestive Specifications for Concrete Storage Tanks and Reservoirs, E—Typical Waterproof Construction, F—Estimating Concrete Buildings, G—Data for Estimating.

The table of contents gives an extensive subdivision of each chapter in a form convenient for any reference, chapters being subdivided by numbered articles. A good example is furnished by chapter 4 Column Footings, as follows: Article 25, Types; 26, Proportions of Concrete Materials; 27, Proportioning Concrete to Suit the Materials; 28, Sieve Analysis; 29, Information on Sieves; 29, Void Determination; 31, Proportioning by Scientific Principles; 32, Importance of Consistency and Good Mixing; 33, Concrete of Maximum Density; 34, Consistency of Concrete; 35, Abrams Measure of Consistency; 36, Steel Placing in Footing Slabs; 37, Types of Reinforcement; 38, Problems for Review.

Vol. 1 has been written in a non-technical strain so that the man in the field or shop, without a technical education, will be benefited by reading the book. This volume can well be used as a text book or hand book by those desiring information on concrete work. Bold faced type has been used to add emphasis to some particular point.

Vol. 2 is now on the press. It is so written as to tell the reader the how and why of elements entering concrete construction.

News of the Cement Mills

Fred A. Ballin, president of the Supple-Ballin Shipbuilding corporation and other enterprises in Portland, Oregon, expects to leave for Los Angeles to close negotiations with that city for the purchase by the United States Potash company, of which he is president, of the Monolith cement plant.

The company has been running this plant, under lease from the city of Los Angeles, for the past year, and it now is ready to close the deal for its purchase. The plant, which has a capacity of 1,500 barrels of Portland cement per day, was built by the city of Los Angeles in the construction of the famous Owens river aqueduct, which carried the waters of Owens river from Inyo and Mono counties to Los Angeles, a distance of 265 miles. The plant cost the city approximately $800,000, and it is to be sold to the Potash company for $450,000.

Representatives of the Dewey Portland Cement Co., Dewey, Okla., and the Ada Cement Co., Ada, Okla., declared that if the 35 per cent increase in interstate freight rates was granted that it would be discriminating against state industries by making the intrastate freight rates higher than he interstate rates, recenly before Ernest I. Lewis, interstate commerce commissioner, who is conducting a hearing in Oklahoma City at the request of the railroad compaines. Testimony was offered to the effect that granting of the increase would mean that several coal companies doing business in the state would be forced to shut down as they would be unable to compete with companies doing business in other states. It is expected that the hearing will end Tuesday.

The request for the raise was made by the railroad companies after the corporation commisison of the Oklahoma lowered the intrastate freight rates 35 percent on June 10, 1921. The railroads contend that if intrastate rates are restored to what they formally were that the increase will make interstate rates correspond to intrastate rates. The railroads further contend that if they are not granted the proposed increase that it will mean a loss to them of approximately $6,000,000 annually.

It is believed by close attendants of the hearing that will be the result of the investigation in which the intrastate rates will be raised approximately 15 percent. No decision will be rendered by Commissioner Lewis until he returns to Washington, where he will review the case.

Cement companies in Oklahoma met the public half way when they appeared recently before the corporation commission and agreed to stamp all invoices for Oklahoma deliveries, beginning immediately, to show a discount from delivered prices equal to 35 percent of the freight charge. The savings amounts to from 10 to 23 cents per barrel.

This action assures to the public immediate and universal benefit of the freight rate reduction recently ordered by the corporation commisison on all commodities.

The Lehigh Portland Cement Co., the biggest industrial concern in Iola, Kans., and one continuously operating, keeping their men on the pay rolls and on full time when many other concerns find it necessary to shut down, is a very human organziation. The No-Accident month campaign started some thirty days ago has ended and the surprising thing about it all is, that with the army of men they employ and with the class of work done, with a little effort on the part of the men and foremen they came through the thirty days without a man being hurt or injured to the extent that he had to lose an hour's time.

This fine record was such a matter of gratification to C. A. Swiggett and C. E. Russell that they provided a banquet for their men to celebrate the event. Great tanks were filled with ice and Muehlbach and pop were loaded into it, and sandwiches were made up with an addition of pickles, mustard and onions to suit the men's tastes, and when they came from work last evening at 5 o'clock they were invited to help themselves and to return for their second helpings as often as they pleased. The boys did it too, and some 500 were treated. The ones on duty were served at their posts.

The Lehigh Portland plant will continue this safety first campaign through the balance of the year. The foremen will look after their men, talk over working conditions with them, eliminate opportunities for injury and if a man does accidentally get hurt, he will not be shot to the hospital in an ambulance and forgotten. The foreman and the workmen will visit him and cheer him up and if his family needs looking after they will attend to it and adjust any business matters requiring attention. Out of the safety campaign will come a real spirit of comradeship known heretofore largely to the soldier of the battle field only or the member of a persecuted race of people. But this work will not promote clannishness, rather it will promote a community spirit, for the Lehigh with other local industries contributed to the erection of the band stand in the park so workmen, with all others of the city, could be entertained. [Iola, Kansas Register.]

The Buffington Plant of the Universal Portland Cement Company can boast of one of the finest cafeterias. This cafeteria was officially opened on December 20, 1920, the opening being marked by the presence of a number of the officials, a musical program by the plant orchestra and several vocal selections by the employes.

The Cafeteria was built by the Company for use by employes and others and food is served to them at cost. It is well patronized by the men and women working in various departments and also by transients and people of the community wanting to get a good meal, at a reasonable price.

The building is of ornamental concrete throughout, typifying various uses of concrete. It is 96 feet by 48 feet, one story and basement. The seating capacity of the dining room is 162 persons at one time and the service is 150 people every fifteen minutes. In this dining room the table tops and wall trim is of vitrolite, which makes a very clean looking as well as an otherwise attractive room.

To make it one of the most beautiful buildings of its kind no expense was spared.

Heating and ventilation is done by means of fans

which constantly change the air by forcing it through heating coils and water baths so that it may be fresh and clean before it enters the various distributing ducts. This air is changed about every three minutes. In heating, a small machine governed by a thermometer, acts when the temperature falls below a certain degree and stops when the heating point has been reached.

Electricity, which is generated at Buffington through the system of utilizing the waste heat that is present when clinker is being burned, does most of the labor in the kitchen, for there they have the mixing batters, meat cutters, slicers, and many other machines which are operated by this power.

In the basement are the laundry, storeroom, shower baths and locker rooms for the employes of this building, boiler room, meat cutting room and refrigerators.

The laundry is equipped with modern washing machines, drier, mangle and electric iron handling all of the cafeteria's laundry. The storeroom holds many days supply of staple groceries.

The refrigerator is a three compartment affair cooled by a sulphur dioxide refrigerating machine that maintains a different temperature in each compartment for the purpose of storing meats, vegetables, fruits or whatever requires a cool storage space at the best temperature and in its separate compartment.

The meat cutting room is adjacent to the refrigerators so all work of preliminary prepartion is carried on in this room instead of in the kitchen. In the boiler room is located the boiler for supplying steam for the steam tables and hot water required for the kitchen, laundry, heating and toilet use, as well as heating the air as previously mentioned.

"Our property consists of about 400 acres of land just outside Guatemala, which is the metropolis and capital of Guatemala, R. de G. C. A. Guatemala is a city of about 140,000 population and lies well up in the mountains about at 5,000 ft. elevation, where the tropical heat is not felt. In fact it is perpetual spring," writes Chester J. Pegg, Manager, Novella Cement Co., Guatemala, C. A.

"The property contains a very high grade limestone, clay and a volcanic ash called "tuffa," which are all excellent cement materials. We, however, use the volcanic ash in place of the clay, as it is nearer the mill and much easier to handle.

"The property contains a magnesium limestone which makes a high grade lime. The company also operates lime kilns and a crushing plant to produce building stone and ballast and fertilizer lime. The fuels used are Mexican crude oil for cement burning and drying, and wood and oil for lime burning.

"Wood-burned limes seems to be the most in demand and brings a very high price. Our cement plants is almost entirely a gravity proposition as shown by sketch, is operated with very little power and consists of the following equipment:

Two 11x22 in. Climax jaw crushers.
One 5x55 ft. Bonnot rock dryer.
One 4x80 ft. Bonnot tuffa dryer.
Round steel storage tanks for dried rock and tuffa.
One Fairbanks hopper scale for raw mix.
One belt conveyor from mix scales to ball mill hopper.
Two Krupp ball mills for preliminary raw mix.
One 5x22 ft. Gate stube mill for raw mix.
One 7x90 ft. Ruggles-Coles rotary kiln.
One vertical steel clinker cooler.
Three 30-in. Griffin mills for preliminary clinker grinding.
One Fairbanks clinker and gypsum measuring device.
One 5x18-ft. West tube mill for finishing clinker.
One double-drum, motor-driven, Florey cableway for carrying volcanic ash from ravine to mill.

"Cement is packed in automatic bagging machines recently installed. Quarry stone is loaded by hand and brought to crushers in Koppel steel dump cars.

"At present our power is bought from a hydro-electric company, but we are developing a hydro-electric property of our own in the mountains where about 2,000 k. w. are available.

"The plant is individual motor driven with three-phase, fifty-cycle, 1,000-volt induction motors.

"Our fuel oil is shipped from Mexico in tank steamers to Puerto Barrios, the Atlantic terminal of the railways, then to Guatemala, in tank cars. The oil and mineral fields of Guatemala have not ben opened up yet to any great extent.

"Our gypsum which is very pure is brought from the Mexican and Honduras border. The plant only started producing cement in 1918 and it has proved to be the very best quality. The plant now produces about 200,000 bbls. per annum.

"The plant is of course complete with auxiliaries such as conveyors, elevators, oil pumps, air compressors, repair shops, and oil burning locomotive for switching."

Boulder-Handling Device for Dredges

Martin Swintek, a practical sand and gravel operator of Eddyville, Iowa, has invented and put into operation a clever device for taking care of boulders in suction dredge operation.

This device is now being manufactured by the American Traveling Suction Screen Nozzle Co., Eddyville. Two of these nozzles are in use by Frank Cram & Sons, Des Moines, Iowa, who have made the following statement regarding its use:

"We are very much pleased with the traveling suction nozzle which we purchased and wish to advise the manufacturer that where we used to pump a car of sand in twenty to thirty minutes we now load the car in nine to ten minutes with the traveling screen nozzle. We have never had to take a pipe down since installing this machine on account of slugs or ogstructions in the pipe line. We can highly recommend this machine as the most wonderful invention in the pumping of sand and gravel. We are now installing the second machine which we just received, on our other plant."

The essentials of the device are shown in the accompanying view of the Cram operation. The chain travels at a speed of only 24 feet per minute and is driven either by a small electric motor or a gasoline engine.

This device also takes care of sticks, logs and other debris that may get in the way of the suction. In its present design no provision is made for recovering and crushing the boulders, the idea being to put them on a conveyor and drop them off the other end of the dredge, or, as in the operation illustrated, drop them into a hopper at the dredge end of the suction. However, it would be easy to add a conveyor and a crushing unit.

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WHEN a difficult explosives problem presents itself, bear in mind that you have at your command a corps of men whose business is to solve it.

These Du Pont field men have spent years in specializing on just that sort of work in every kind of explosives operation under almost every conceivable condition.

They are constantly in touch with the latest developments in the laboratory and in the field.

They have saved users of Du Pont Explosives hundreds of thousands of dollars.

Service at the point of use, such as these men supply, is backed up by a nation-wide system of distribution and delivery; by a control of manufacture assuring uniformly high quality; by a technical staff constantly discovering and incorporating improvements in product—This constitutes Du Pont Explosives Service—and it is at *your* command. Write or wire our nearest branch office.

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News of the Concrete Products Factories

Dakota Concrete Stone Co., Sioux Falls, S. D., is erecting a new plant, their business having outgrown the former plant. A siding will be laid from the Omaha railroad so as to facilitate loading and shipment. The company specializes in the manufacture of concrete culverts.

Lawton Concrete Brick Co., Lawton, Okla., has been organized by L. H. Ensley, capital $5,000.

A. Crawford, building material dealer, 1702 Stone St., Port Huron, Mich., also operates a cement block factory (Kramer Machine). Wants prices and catalogs on crusher, marble chips, mica spar crystals and waterproofing compound.

Valley Concrete Pipe Co., Box 97, Yuba City, Calif., wants prices and catalogs on building block, building tile and chimney block machines, septic tanks and fence post molds.

"We claim—and conservatively—that the Kent Mixer has embodied in its design and construction more real points of superority than any other mixer made for concrete products factories," writes the Kent Machine Co., Kent, Ohio.

"Some of the outstanding features are: Correct and proper proportioning of aggregates; continuous in operation; time and labor saver; especially designed for concrete products plants; does its own measuring, proportioning, mixing, watering and discharging accurately; operates entirely by itself; does away with the cumbersome hoisting cars, charging platforms, chains, cables and what not on many of the old-fashioned batch mixers, etc., etc.

"It is the choice of the well informed.

"To fully explain these and many other points of superiority—may we send you a catalog?"

With price of concrete blocks back to a pre-war basis, impetus to the long delayed building boom is predicted by Phillip Hoerr, proprietor of the Ideal Concrete Block Manufacturing Company of East Peoria, Ill.

Price for concrete blocks today is 25 per cent lower than the prices in April of this year, and 33 per cent lower than the peak price in July, 1920, according to Mr. Hoerr.

"The cut in prices has been made in line with our policy of a speedy return to normal conditions that the housing problem which has been acute for five years may be relieved," Mr. Hoerr says.

The factory situated adjacent to the washed sand and gravel plant through unlimited supplies of raw material so afforded has an output of 300,000 concrete blocks each year.

The white silica sand face block which is thoroughly waterproof, is manufactured in the Peoria territory by this company only, according to Mr. Hoerr.

DeLhorbe Concrete Products Co., Oregon, Ill., writes: "Have just received a letter from patent attorneys, announcing our application for patent for the improvement in septic tanks, serial No. 443610 was allowed July 27."

Only four of the cement manufacturers of St. Paul, Minn., have as yet obtained their licenses from the building inspection bureau.

Under the new building code these manufacturers are required to secure licenses and also to have blocks they make tested once every six months.

There is no charge for the license fee, but a charge of $2 a block is made for testing.

Records in the building inspection bureau last week showed that out of the 20 cement block manufacturers of the city only the following had secured licenses: A. F. Carlson, Blair St. and Snelling Ave.; Palace Cement Stone Co., Palace St. and Lexington Ave.; Capitol Ave. Cement Works, Hubbard and Griggs Sts., and the St. Paul Cement Works, Minnehaha and Chatsworth Sts.

Jotsen Concrete Works, 1414 S. 9th Ave., Sioux Falls, S. D., have been compelled to move to larger quarters on account of a rapid growth in its business. They operate a Kraemer and two Hobbs block machines and tampers, Automatic Sealing Burial Vault molds and a Kent mixer.

Iron Mountain Cement Products Co., Iron Mountain, Mich., recently organized by Mr. Thomas U. Stafford, a local contractor, have started operations. Their plant is equipped with the most modern up-to-date machines, including an Anchor block machine and tamper, Wert brick machine, Dunn mixer and Anchor ornamental molds.

Bemidji Concrete Mfg. Co., Bemidji, Minn., have completed the installation of its building tile machine. This company's confidence in its product is amply demonstrated by the fact that the entire factory is being built of concrete tile made on the new machine, over which a temporary structure has been erected. With the aid of excellent aggregate the tile produced are dense, uniform and waterproof; in fact, no stucco or other facing material is to be used, as the unfinished tile produces an unusually good looking concrete structure. Aside from the standard equipment for building tile, this machine has also been equipped with brick attachment which produces 10,000 standard brick per day on the face-down principle. Only two men are required for operation and plain wooden boards are used for pallets.

F. Carnegie, 303 S. Earl St., Kinston, N. C., has organized the Carnegie Hydraulic Stone Works, having purchased up-to-date concrete block equipment from the Hydraulic Ramming Concrete Stone Machinery Co. of Little Falls, N. J. Mr. Carnegie declares that his plant will be one of the largest in the country producing only a high class building unit of standardized dimension. Under one operation the hard concrete stone are veneered with marble chips furnished by the Middlebury Marble Co. and sprayed as they come from the machine producing a reconstructed stone in nature's own beauty. The company will also manufacture ornamental concrete products such as flower vases, lawn furniture and porch columns. The molds for making these products were furnished by the Concrete Equipment Co., 540 Ottawa St., Holland, Mich.

KENT CONTINUOUS MIXER
for CONCRETE PRODUCTS PLANTS

Is your plant equipped with modern machinery that saves labor, holds down your pay roll, and turns out large quantities of QUALITY products at a low cost? You have not the proper equipment if you are mixing concrete with a machine designed in fact for another trade.

The Kent is especially designed for the needs of concrete products plants. It is low in cost, continuous in action, easy to keep in repair and it has a good clean record of 15 years in the industry.

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When once they are seen and used in a community the Automatic Sealing Burial Vaults come into instant demand. They are far superior in every way to any other cement or steel vaults.

The manufacturing of these Automatic Sealing Burial Vaults with our Adjustable Steel Molds is a big money making opportunity. The first ten vaults you sell will more than pay back your entire investment—materials, molds, time, etc., etc.

Write us for complete particulars.

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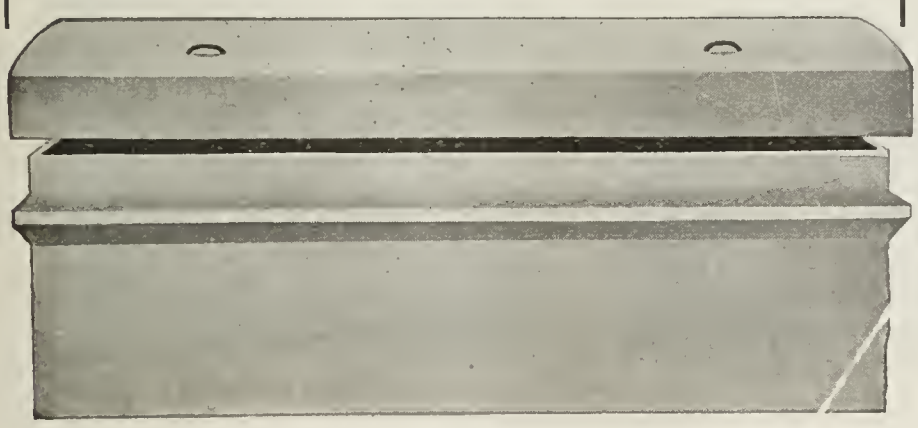

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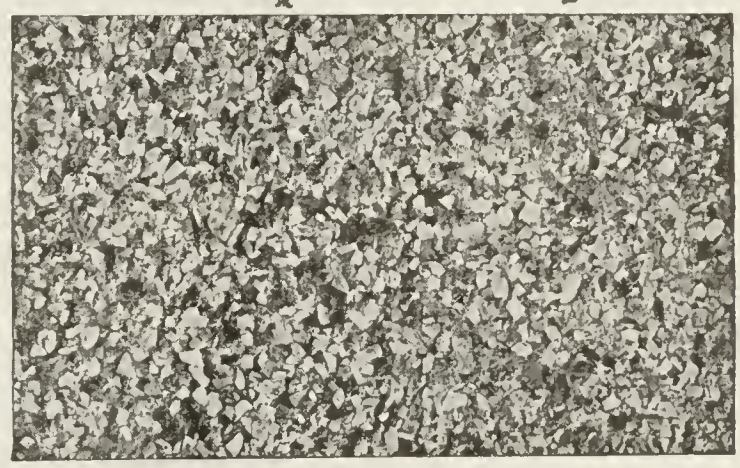

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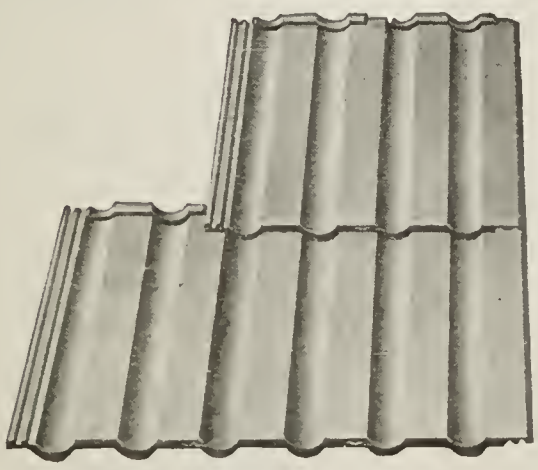

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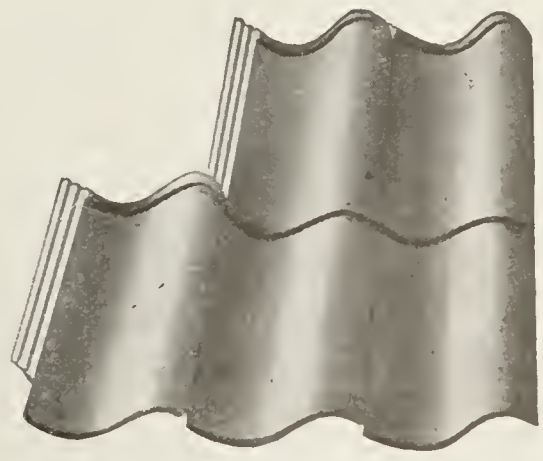

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For the Efficient and Economical Conveying of Sand, Gravel, Crushed Stone, Cement, Clinker, and Coal

Your plant is a success, of course. You have made it such by devoting your energies to it, by carefully studying out every possible way to increase its efficiency and economy of operation. It represents and reflects your personality.

BUT—have you given to conveyor belting the attention this most necessary and important item of equipment deserves? Of course, you know that this method of conveying is universally recognized as the only up-to-the-minute, thoroughly modern way to handle cement, clinker, coal, sand, gravel and crushed stone. But do you know that, in AJAX BELTING, you can get, at a medium price, those features of flexibility and wear resistance which make them stand up under hard, continuous usage in a way which you would expect only from higher priced belts?

The reasons are evident. Fifty years experience in good belt making, proper materials and the most modern equipment are bound to give RESULTS.

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A REAL PROFIT MAKER

FLEXO CONCRETE MOULDS

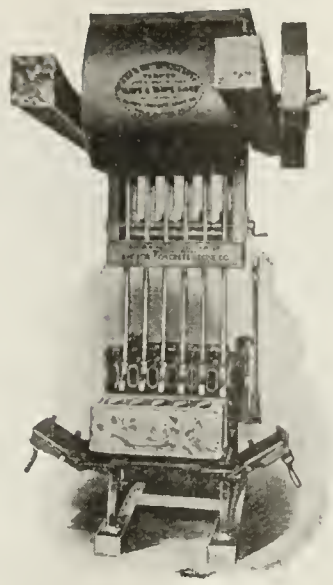
Produce with extreme economy and speed the building stone that sells fastest. It is the final word in the manufacture of slush poured concrete block, plain or faced. Why limit your profits by using a system less perfect. Get behind the FLEXO-CRETE blocks and make more money out of your time and investment.

The moulds are galvanized and rust proof. All parts are interchangeable. Simple, Substantial, Self squaring and easily handled.

Flexo Moulds are manufactured under Patented Rights.

FLEXO CONCRETE MOULD CO.

216 Masonic Temple CEDAR RAPIDS, IA.



THE HOBBS

The multiple oval cores of a Hobbs machine make the use of wet mix possible with no loss of time. The result is a hard, dense, waterproof block—plain for foundations and cover walls—faced for superstructure.

For Catalogs and Prices, write

The Anchor Concrete Machinery Co.

Home Office: Rock Rapids, Iowa
Branch Office: Columbus, Ohio

Which Do You Manufacture, Sightly or Unsightly Brick?

Make poured concrete brick, the kind of brick that are used for faced work. You can't get anywhere by calling a dry tamped brick a wet brick. To succeed you must have poured brick.

Our circular explains the difference between the poured and dry tamped concrete products.

MERRILL MOORE **CRESTON, IOWA**

THE POLK SYSTEM

All-Steel Machines for All Kinds of

Circular Concrete Construction

We contract grain storages.

Polk Genung Polk Company

521 Occidental Bldg.
Indianapolis, Ind.

Fort Branch,
INDIANA

Henry Heil Chemical Company

210 to 214 South Fourth Street, ST. LOUIS, MO.

We make a specialty of supplying cement works with

Chemical Apparatus, Chemicals and Reagents

Gilmore's Needles, Cement Moulds, Vicat Apparatus, Schumann's, LeChatelier's and Jackson's Specific Gravity Apparatus, Etc.

Pyrometers, Calorimeters

High Grade Goods Only

Satisfaction Guaranteed

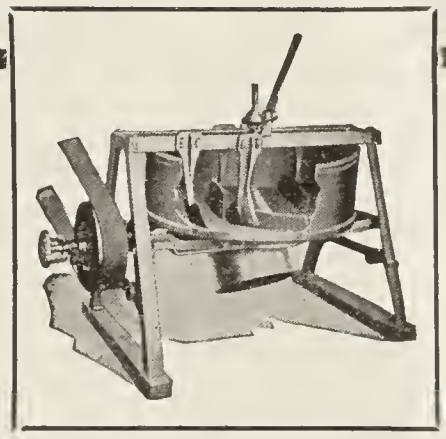
An all-round mixer for all-the-year-round work. Use it on all your concrete, mortar and plaster mixing jobs.

CONTRACTORS USE THIS MIXER ON THREE TIMES AS MANY JOBS

Portable Dunn Shovel Mixers are designed to mix mortar and plaster as well as concrete. They are built to do this work better than you ever had it done before. We want you to expect more service from it than from any other mixer. Don't be afraid of overworking it; keep it busy day after day on all of your mixing jobs. Even if you give it three times as much work to do as you would an ordinary mixer, it won't wear out any sooner.

You'll like the ease by which this mixer is charged, its rapid and convenient bottom discharge, the way it cleans itself, its compactness, portability, sturdiness and dependability. Because it will mix concrete, mortar and plaster and because of its many features, you really get three mixers for the price of one. And you pay no more for it than for an ordinary mixer. Try it out for a couple of weeks before you buy.

Ask Us to Send You Bulletin T-20



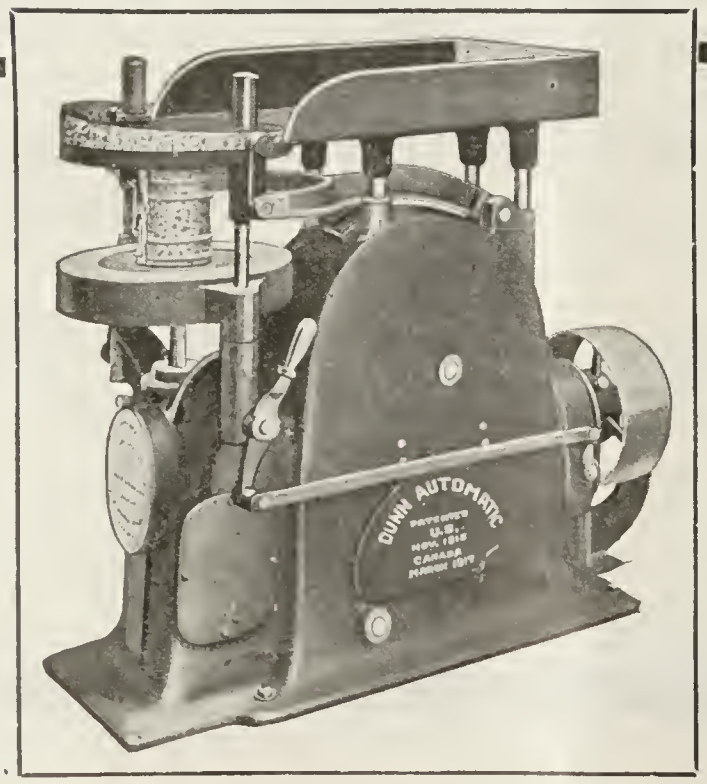
The Dunn Shovel Mixer produces a thoroughly mixed, plastic material because of its four shovels. A hundred times a minute the material is shoveled, stirred and troweled.

It not only saves the labor of one man, but it improves the quality of your products and increases your production. You may try it out before buying.

RUN YOUR PRODUCTS PLANT WITH ONE MAN LESS

With a stationary Dunn Shovel Mixer properly installed you can improve the quality of your products and increase your production with one man less than you are now employing. Simply because power and gravity are utilized to accomplish automatically what you are now doing by hand. The only labor involved in keeping your production machines, whatever they might be, constantly supplied with material is in loading a bucket below the floor level with the unmixed materials.

You'll be interested in knowing that the cost of this complete mixing and conveying equipment is less than that of the ordinary conveyor alone.



Write for Bulletin M-21

THE BUSINESS OF MAKING HOLLOW TILE

The immense demand and market for a more economical, more permanent building unit, such as hollow concrete tile, is readily evident in every community. Supplying this market means a permanent business bringing in large earnings.

It is a big part of our business to completely equip standardized plants for turning out this hollow tile and other products in large quantities at low cost. That we are able to establish you in a most profitable business is demonstrated by the success enjoyed by all Dunn Plant owners.

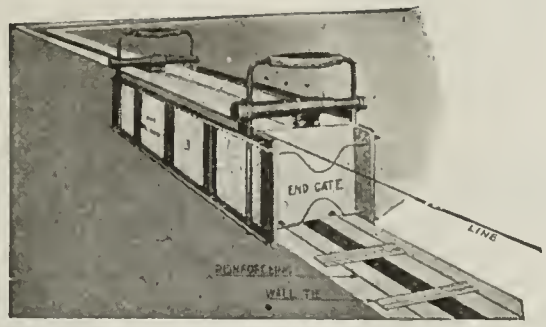
There's a whole lot to be said about this proposition which will interest you. Drop us a line for particulars.

W. E. DUNN MFG. CO.

414 W. 24th Street

HOLLAND, MICHIGAN

Build the Hollow Wall Way



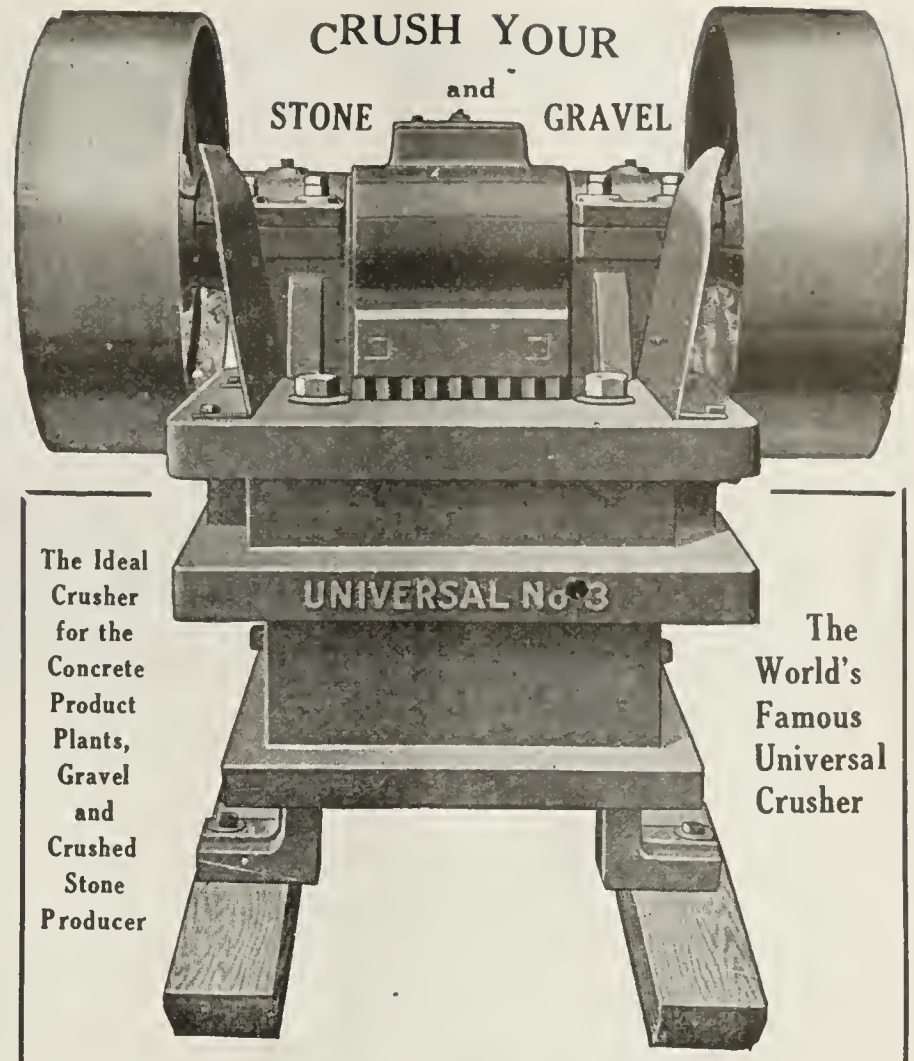
Like a thermos bottle—warmest in winter—coolest in summer. Fire-proof—everlasting.

Cheapest, best and most perfect way known to the building world.

The reason the most wall can be built for the least money with our forms is—because they are STRONGEST—LIGHTEST—SIMPLEST and MOST PERFECT, and the price of a complete set can be saved on one small job. Send for literature.

The Universal Cement Mold Co.
North Milwaukee **Wisconsin**

CRUSH YOUR STONE and GRAVEL



The Ideal Crusher for the Concrete Product Plants, Gravel and Crushed Stone Producer

The World's Famous Universal Crusher

We Build Crushers from 5 Tons to 300 Tons per 10-hour Capacity

Instantly adjusted to produce size required from ¼ inch to 3 inches. *Write for Folder No.* 14.

UNIVERSAL CRUSHER COMPANY
230 Bee Ave. Cedar Rapids, Iowa, U. S. A.

Big Profits Making Septic Tanks
BENEFIT BY OUR EXPERIENCE

After years of successful operation of a Concrete Products Plant, we have experienced in the last six months, the dullest time in its history in the sale of blocks, brick, stave silos and burial vaults. During this time the sale of our Unit System Septic Tanks has increased beyond all expectations. We are shipping them out in single shipments, and car lots, and we are four weeks behind our orders. We sell to the plumbing trade and plumbing jobbers and in some localities we have agents selling directly to the farmer and the villaage house-holder.

Every family who is not situated on a sewer is a prospective customer.

The profitable shipping distance is a radius of about two hundred miles from our plant, and we have decided to offer for sale to other concrete products plants the forms to manufacture Unit System Septic Tanks.

The limitations of this new business are boundless. A sewing machine agent considers two or three sales a week good business, but one of our salesmen sold eighteen installations of our septic tanks three weeks ago last Saturday, in the little village of Erie, Ill., with practically the same profit for each installation as is made on the sale of a sewing machine.

You have little or no competition in your territory. Septic tanks are sold every month in the year. Our customers are community high schools, public schools, offices, stores, churches, hotels, dwelling houses, industrial plants, etc.

Business is good with us. Let us pass these conditions on to you.

For Full Particulars Write

WM. DE LHORBE **Oregon, Ills.**

WATER

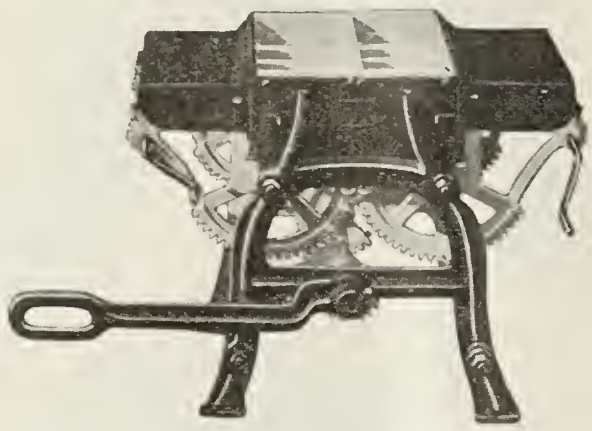
WE-FU-GO AND SCAIFE
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

BELTING

"V-B" Balata
"AMPERE"
(Canvas Stitched)
GRIP-ON
(Impregnated Solid Woven)

Write for Prices, Discounts and Samples
VICTOR BALATA & TEXTILE BELTING CO.
Factory: Easton, Pa. Main Office: 38 Murry St., New York
Stores: 167 N. Market St., Chicago and 85 Purchase St., Boston
CONVEYOR BELTS A SPECIALTY



Double your daily output with
DOUBLE-SPEED
Brick and Block Machines

Now is the time to increase the capacity of your block plant—turn out the maximum number of wall feet per day, while the demand for building materials is at its highest.

Block Output

Our Double-Speed Block Machine makes in each operation: 2 hollow blocks, 2 silo blocks, 2 solid blocks, 2 slabs, 4 half blocks, 2 water table slabs, 2 return ends, 2 chimney blocks, or 2 porch pier blocks.

Brick Output

Double-Speed Brick Machine makes 16 brick at each operation, 8 brick being delivered at each side of the machine.

Double Speed Tamper

This power tamper gives our block machine a capacity of 1,500 blocks per day and speeds the brick machine up to 15,000 brick per day. Roller-cut-off removes surplus material from mold box and finishes the top of the product. The block and brick are tamped rapidly and vigorously, resulting in a dense, strong product. Machine consumes little power and is practically fool-proof.

Write for block and brick machinery catalog, Dept. A,

Wood Bros. Thresher Co. Des Moines, Ia.

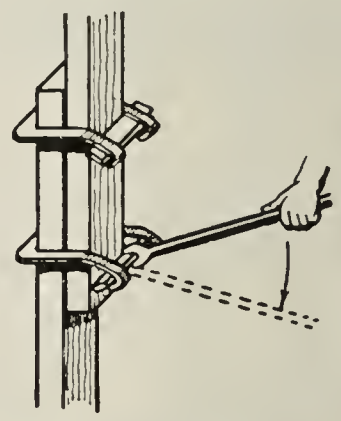
Are You a Contractor?

If you are, you will want to look further into the economy of the Schenk Patented Timber Clamp for shores. No nails are used—nor boards sawed to any required length.

Labor and loss of material are saved — important items on any job. The clamps are placed in a moment's time, and will support the heaviest pressure.

Write for our catalogs.

The
Schenk Timber Clamp



Schenk's Patented Timber Clamp., Co., Ltd.
2292 Larned St. East
DETROIT

AGENTS WANTED
THROUGHOUT
THE U. S.

Hollow Walls and Solid Walls

These Forms build either kind. The Forms will owe you nothing after you have built the one job. They are so Cheap. They are strong and dependable forms and the lightest forms built. Don't break your back lifting forms from the wall. Let us prove these statements.

Send for our catalog

THOMPSON FORM & CLAMP CO.
Fond du Lac, Box 166 Wisconsin

SELECTED WHITE SAND

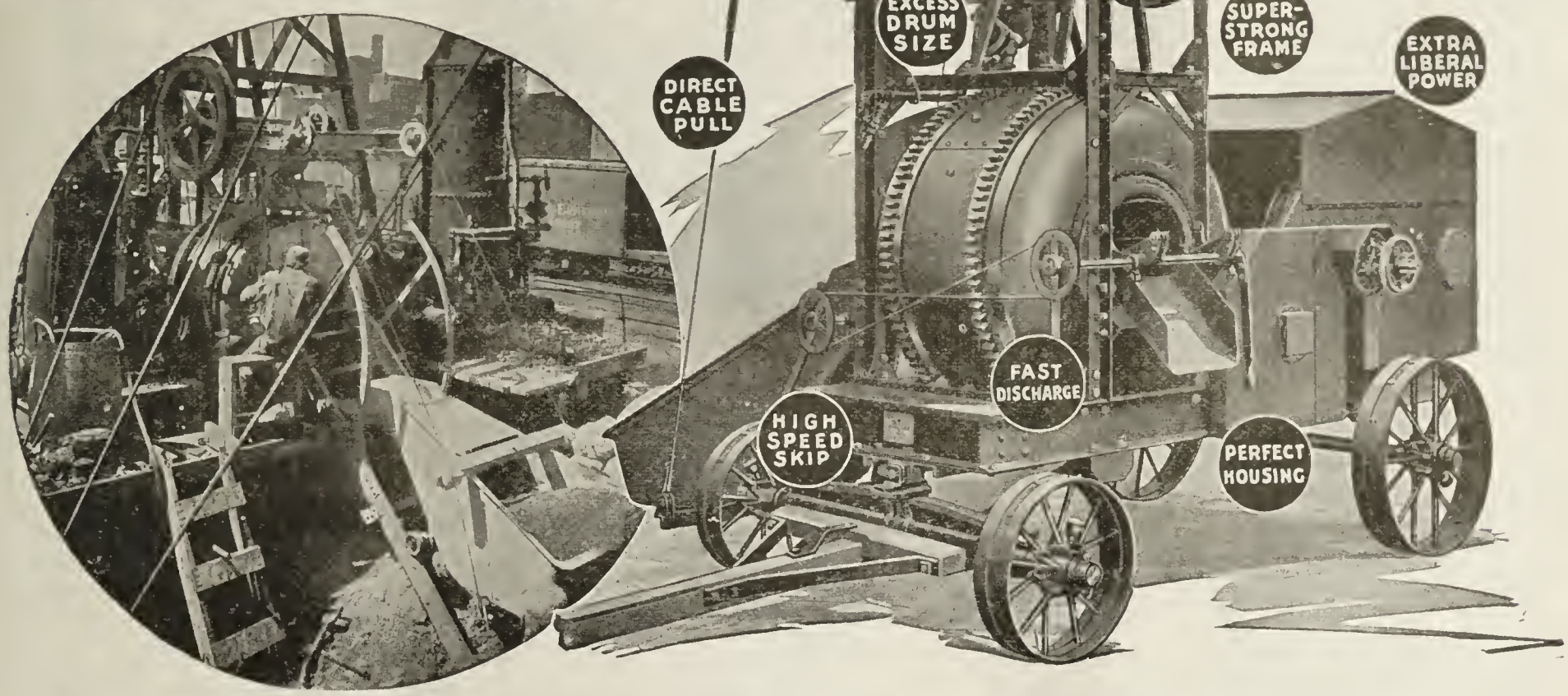
UNEXCELLED FOR
Facing Concrete Blocks, Ornamental Concrete Stone, Hard Plaster, Finishing, Exterior Plastering, Roofing, Stone and Marble Sawing, etc.

Prices, Freight Rates and Samples on Application
Shipped in Paper Lined Box Cars
Small Shipments in 175-lb. Bags

Ottawa Silica Company
OTTAWA, ILLINOIS

KOEHRING

HEAVY DUTY MIXER



THE **surest-profit** factor you can bring on a job—mixer dependability in the form of Koehring heavy duty construction.

Koehring-mixed concrete is **Dominant Strength** concrete, so established by official tests whereby Koehring mixed concrete has been proved to be as much as 31% stronger than concrete mixed by other mixers.

Due to the Koehring **re-mixing** action Koehring-mixed concrete is uniform in distribution of aggregate to the last shovelful of every batch.

Write for Koehring catalog No. B-5—a book that shows in detail Koehring heavy duty construction—shows you how to judge mixer value.

Koehring Capacities

in cu. ft. wet batch rating

Pavers 10, 14, 21 and 28 cubic feet mixed concrete, with or without loading derrick.

Construction Mixers, 7, 10, 14, 21, 28 cu. ft.

Hot Mixers for bituminous work, 9, 14 cu. ft. side charging type; 18 cu. ft. paver type.

Gasoline, Steam and Electric Power.

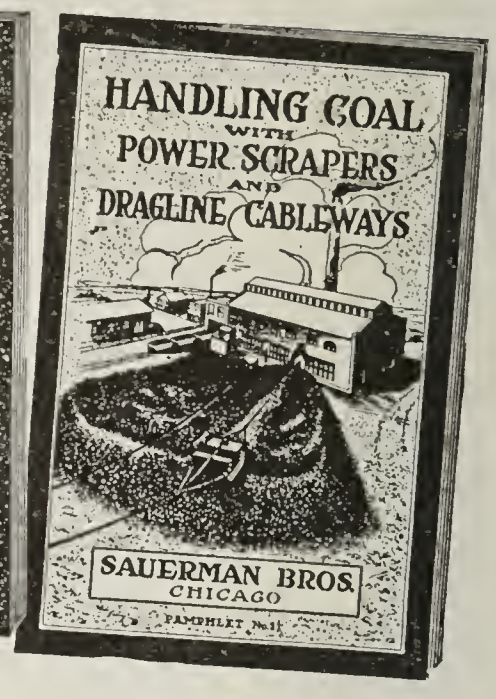
DANDIE LIGHT MIXER

Koehring Dandie Light Mixer—4 and 7 cu. ft. capacity, wet batch rating—a light mixer that brings dependability into the light mixer field—at a price that makes it the remarkable value of the industry. The reasonable investment mixer for miscellaneous work on big contracts, for footings, culverts, silos, etc., or for all general work within capacities. No. 104-S, gasoline, No. 107-S, steam and gasoline—may be equipped with standard or batch hopper, low charging platform, or power charging skip, automatic water-measuring tank or light duty hoist. Write for catalog B-45.

KOEHRING MACHINE CO., Milwaukee, Wis.

Sales and Service Offices and Warehouses in all parts of U. S.

These Booklets Are Easy to Read and Worth Reading



Pamphlet No. 15
gives details of the various types of dragline cableway excavator installations suitable for general dirt-moving operations, brick and tile plants, and so forth.

Pamphlet No. 14
is a handy compilation of data on the dragline cableway excavator method of excavating and conveying sand and gravel, illustrated with many views of typical installations.

Pamphlet No. 12
describes the latest developments in the use of mechanical drag scrapers for handling gravel from hillside, and explains the adaptability of power scrapers for small pits.

Pamphlet No. 11
illustrates practical solutions of various storage problems by use of scrapers and dragline cableways, some of this information being now published for the first time.

Which of the above pamphlets do you want? Send in your request at once.

SAUERMAN BROS. 1139 Monadnock Bldg., CHICAGO

Patent Pending

Our Late Development of

POWER DRAG SCRAPER

Is proving its worth

We will shortly be prepared to mail you CONCRETE INFORMATION including photographs and drawings of just what it is doing for others during the present year. This information will be especially valuable at this time when you should be familiar with the most economical methods of excavating.

L. P. GREEN
907 Lumber Exchange Bldg.,
Chicago

Extraordinary Announcement:

The Breakers

ATLANTIC CITY, N. J.

ON THE OCEAN FRONT FIREPROOF

Remarkable Reduction in Rates

From September 19th, 1921

European Plan	American Plan
$2.50 up daily, Single	$42 up weekly, Single
$4.00 up daily, Double	$77 up weekly, Double

Hot and Cold Sea Water in all Baths

Fireproof Garage on Premises

New Golf Club Privileges

SAND PUMPS

That pay the largest dividends per dollar of investment.

"The Pump That Makes The Money."

This Pump is all that is implied in the name

LIGHTNING

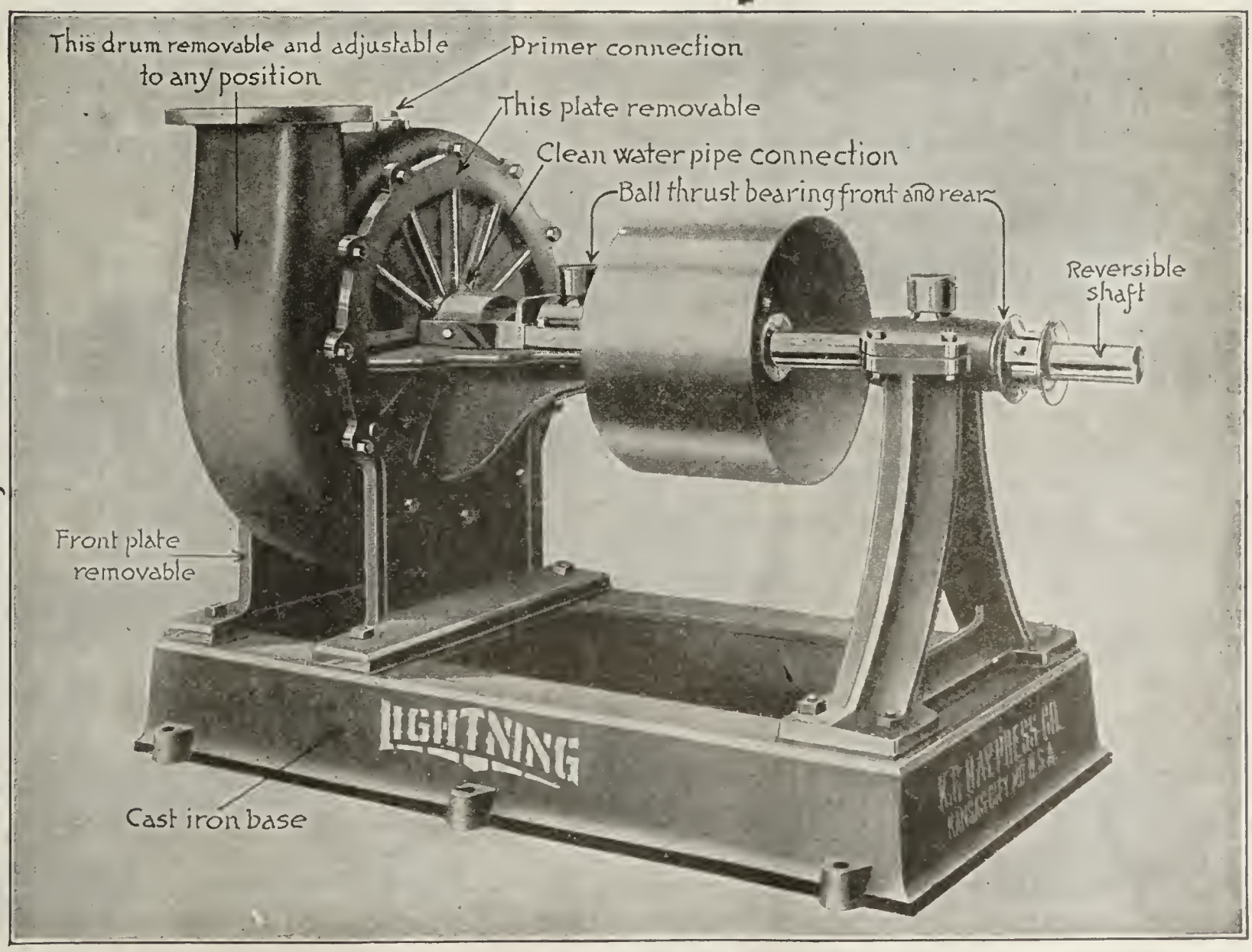
Its rugged construction and Simple operation assures maximum efficiency in operation at all times.

It is easy to adjust and easy to replace parts. Thousands in successful operation are striking endorsement of their dependability.

KANSAS CITY HAY PRESS & TRACTOR COMPANY

KANSAS CITY, MISSOURI

THE PUMP OF SIMPLICITY AND STRENGTH



REICHERT Adjustable Steel Molds

Improved locking device, saves time. Light, accurate fit at joints produce smooth finish.

They help you land contracts
You can bid lower, at no loss of profit. Reichert Forms are standardized—units interchangeable. Ask for catalog.

Reichert Metal Concrete Forms Company
1188 Weil Street Milwaukee, Wis.

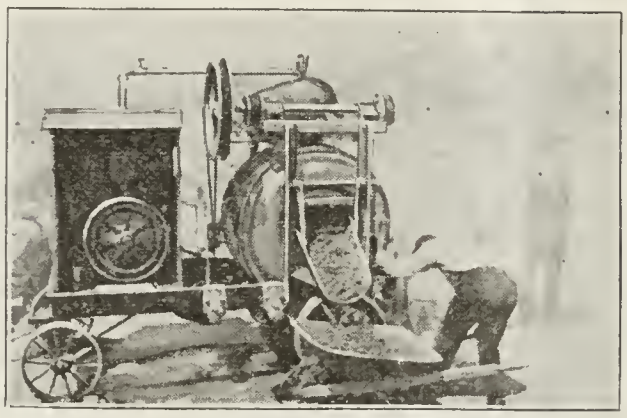
SAVE CEMENT

Salvage from 5 to 10 sacks of good cement from each 1,000 empty sacks and reduce labor by one-half—by cleaning them in our

Unit Sack Cleaner

Write us for particulars.

Handy Sack Baler Co.
620 S. 2d St.,
Cedar Rapids, Iowa



THE *Atlas* MIXER

Represents the best established practice in Concrete Mixer Construction.

Its dependability and simplicity commends it to the contractor who appreciates the importance of uninterrupted service.

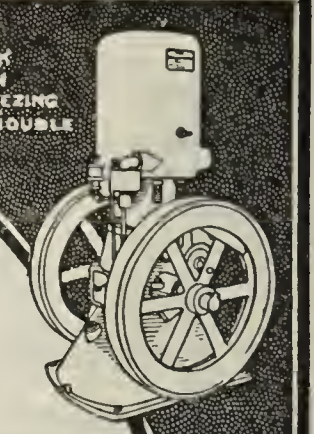
The Atlas is made in various sizes and styles. Let us mail you our catalogue.

Send for it today—NOW

ATLAS ENGINEERING CO.
3023 Lisbon Ave. Milwaukee, Wis.

P. S.—If you are interested in material handling equipment, let us mail you our ATLAS Wagon Loader, Box Car Loader, Car Unloader, Belt and Bucket Conveyor and Portable Storage Bin catalogue. The catalogue is yours, simply ask for it.

No Skilled Engineer is Needed for the Novo



This is one of several reasons why the Novo Engine proves so economical and why it should appeal to every contractor. Then the Novo is so light—the lightest engine for power developed—that a lot of time is saved in moving your mixing outfit. Time lost soon runs into money.

NOVO ENGINE

"The Engine for Every Purpose"

The absence of lateral vibration adapts the Novo particularly to the running of cement machinery. Ten sizes, 1 to 15 h. p.

Send for Novo Catalog

and look into this question of power. It is worth careful consideration.

Novo Engine Co. **Clarence E. Bement**
Sec'y and General Manager
219 Willow Street - - Lansing, Mich.

"Perfect" Concrete Power Machine

C. S. WERT Inventor and Patentee

Built entirely of steel and iron.
Turns out, with four men, 1,000 to 1,200 concrete blocks in ten hours.

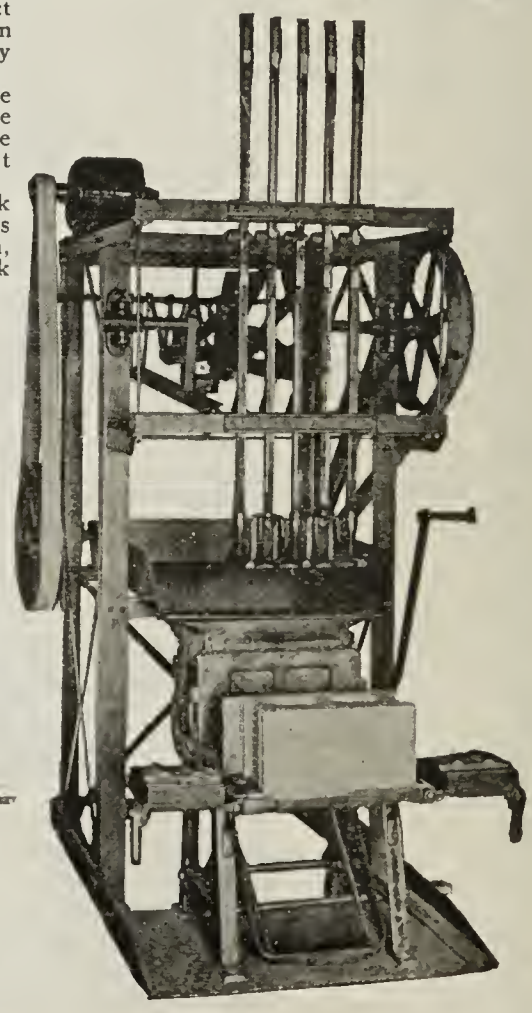
In severe tests, Perfect Concrete Brick have proven stronger than common clay and pressed clay brick.

The power tamper may be operated by a one horse power motor, a 2½ horse power gas engine or direct from a line shaft.

"There is no better brick machine manufactured," says W. T. Sharp, of Montana, owner of a Perfect brick plant.

Also Hand and Power Brick Machines Hand Brick Machines Well, Cistern and Silo Molds

Get facts and figures now. Write while the matter is on your mind.



Manufactured by
The Wert Manufacturing Co.
547 Railway Exchange Bldg.,
Chicago

for facing concrete work

FOR the stucco suburban home—the modern public utility plant and factory—the bank and office building—first call is for Middlebury Terrazzo for facing concrete work.

Middlebury Terrazzo has all the appearance of solid marble—with all its advantages and at a material saving in price.

Made from Middlebury White and Crême Statuary Marbles, it is furnished, carefully graded to size, in either dust, No. 1, 2 or 3.

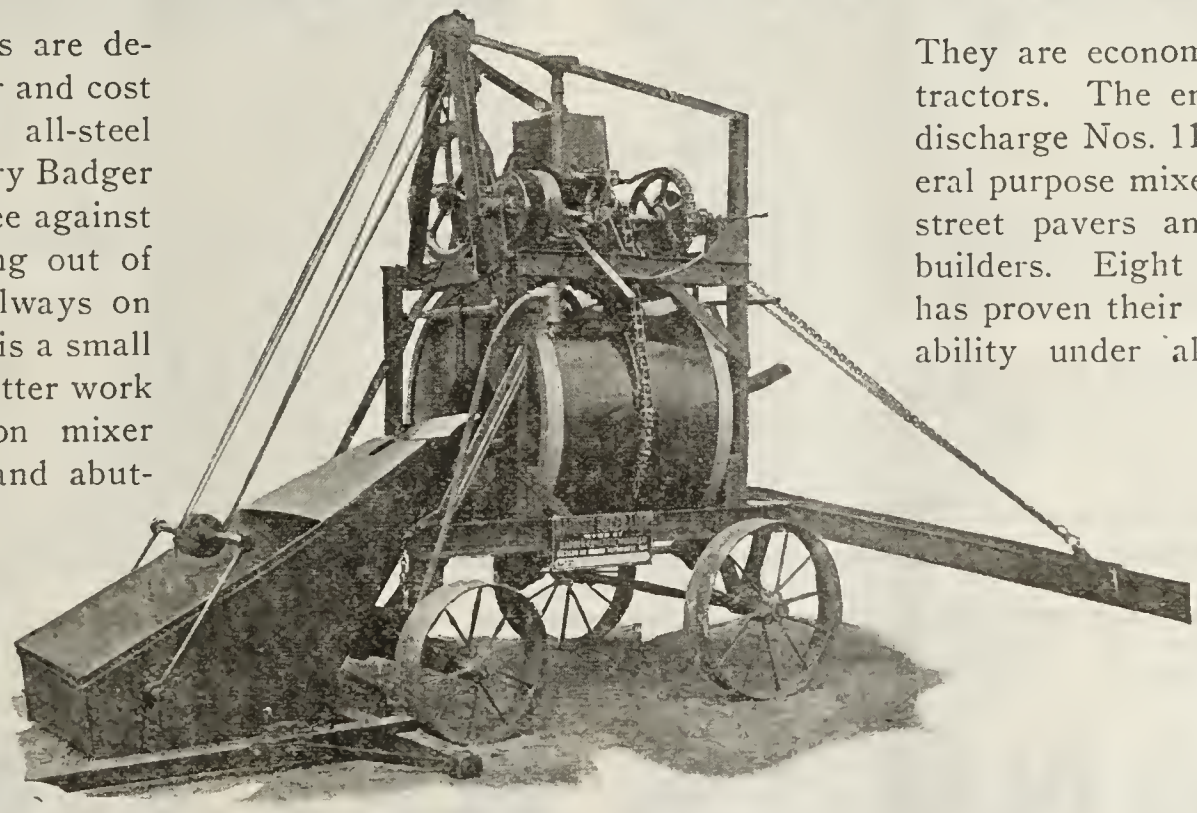
Send today for free samples and prices

Middlebury Marble Company

BRANDON, VERMONT

BADGER MIXERS

The Badger Mixers are designed to save labor and cost of operation. The all-steel construction of every Badger Mixer is a guarantee against breakage or wearing out of parts. They are always on the job, whether it is a small mixer on curb or gutter work or the construction mixer upon foundations and abutments or the alley and street paver. Their light weight and durability has made a distinctive reputation for the Badger Mixer.



They are economical to the contractors. The end load and end discharge Nos. 11 and 15 are general purpose mixers and alley and street pavers and country road builders. Eight years of service has proven their absolute dependability under all conditions of concrete work.

Write for our attractive prices.

The ~ Badger ~ Mixer Line

BADGER CONCRETE MIXER CO., 13th Floor MAJESTIC BLDG. **MILWAUKEE, WIS.**

CLOSED—For Storing or Transporting.

ECONOMY STEEL SCAFFOLDING

is being used by a number of leading Chicago contractors, such as Thompson Starrett Co., R. C. Wieboldt, Blome Sinek, E. W. Sproul & Co., Math Rauen Co., Gerhardt Meyne and many others, who will gladly recommend them to every contractor as a good asset in equipment.

The illustration is of the Mason Horse 4 ft. 6 in. high and 5 ft. 0 in. wide which weighs but 60 lbs., they are sturdy in construction and their compactfulness when folded makes them very easy to handle, transport or store.

A TRIAL ORDER WILL CONVINCE YOU THAT THEY ARE A NECESSITY.

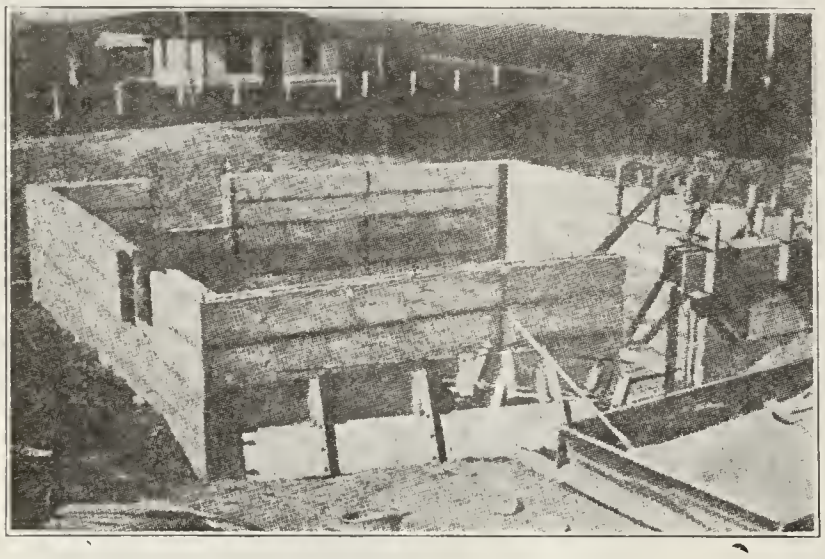
Price $6.00 each, F. O. B. Chicago.

ECONOMY SCAFFOLD CO.

4611-19 West Fulton St. CHICAGO, ILL.

FROST HOLLOW WALL FORMS

ADJUSTABLE TO ANY KIND OR SIZE OF BUILDING



With our forms you can build a double wall, reinforced concrete building to compete with the cost of frame construction.

Moisture-proof, fire-proof, repair-proof walls. Save paint, lath, time and labor to you. Save repair, fuel and insurance to the owner.

Forms adaptable to any size building, adjustable to any thickness wall. Built of poured concrete, reinforced three ways with continuous dead air space makes the most desirable method of building construction. Simple to use, easily adjustable. No skilled labor required. Method has been tried and proven.

Write for complete description of method and its operation, photos showing work done, and costs.

HOLLOW CONCRETE WALL CO.

H. T. FROST, PRESIDENT MITCHELL, SOUTH DAKOTA

HETTRICK RED STITCHED

CANVAS BELTING

Made from the highest class duck obtainable, having a tensile strength of 500 pounds to the square inch. Sewed in heavy modern machines with specially made twine. Stretched to the proper degree and treated with gums and oils that preserve the fabric and make the belting soft and pliable under all conditions.

Ask for Samples and Prices

THE HETTRICK MFG. CO. TOLEDO, OHIO

Cut Gears

Spur,
Spiral,
Bevel and Worm
Steel and Rawhide

Accuracy and Prompt Delivery

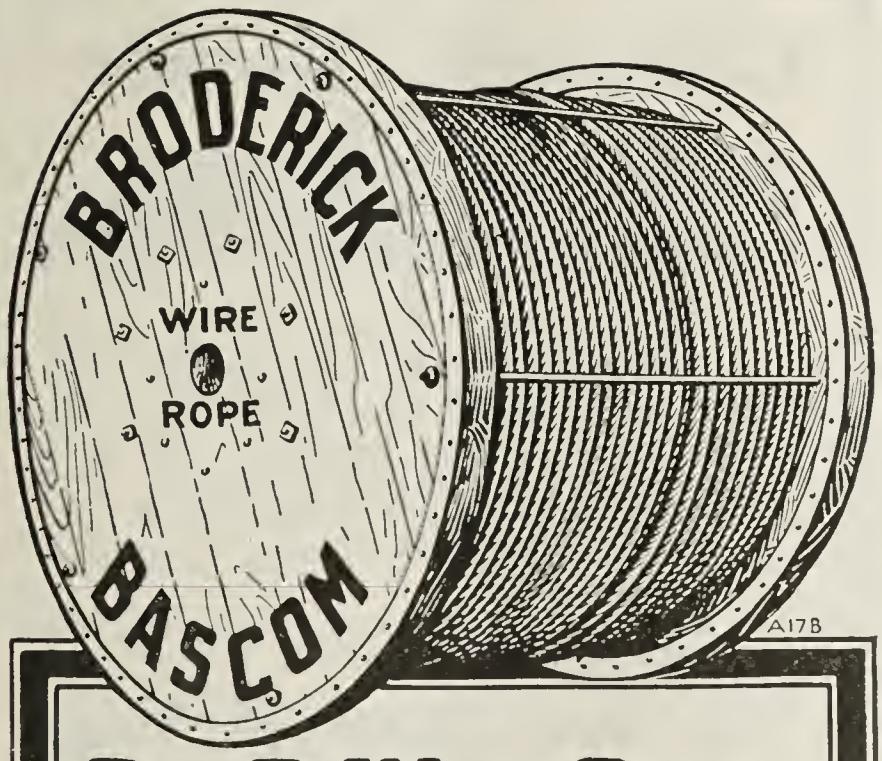
When you want a gear cut you want it **quickly,**—we emphasize our promptness without sacrificing accuracy.

Ganschow Cut Gears

stand first in accuracy—perfect mesh—silent operation and the quality that counts for long service.

Estimates furnished from drawings and specifications.
WRITE FOR CATALOG.

WILLIAM GANSCHOW CO.
1003 W. Washington St. - CHICAGO



B. & B. Wire Rope

Measure B & B Wire Ropes against the requirements you demand in the best hoisting line. They're flexible, steel-strong, durable.

With those requirements successfully met, B. & B. Wire Ropes are bound to be dependable and economical. Write for Catalog 60

BRODERICK & BASCOM ROPE CO., St. Louis, Mo.
Manufacturers of Celebrated Yellow Strand and all standard grades of Wire Rope
Branches: New York and Seattle Factories: St. Louis and Seattle

NO OTHER CLUTCH HAS ALL THESE ADVANTAGES

Plamondon Disc Type Friction Clutches have every known feature that makes toward efficiency, economy and durability in clutches. For the most economical transmission and distribution of power and easy control of the same, there can be no logical choice but that of the

PLAMONDON DISC TYPE CLUTCH

Plamondon Clutches defy the most adverse conditions Their absolutely dustproof construction renders them particularly suitable for use in cement mills, etc.

We have a 57 years' service record for this clutch.

Write for our new catalog No. 59

A. PLAMONDON MFG. CO.
5301 So. Western Blvd.
CHICAGO, ILL.

We manufacture Spur Gears, Bevel Gears, Miter Gears, Spur Mortise Gears, Bevel Mortise Gears, Miter Mortise Gears.

INLAND

Steel Reinforcing Bars

Three grades: open hearth steel (new billet stock), "medium" and "hard" grade, and rail carbon steel (re-rolled). Both theory and practice agree on the design. Rounded corners prevent splitting of the concrete. Bending, fabricating and setting are easily done with these bars.

Sizes ⅜ to 1¼ inch. Lengths up to 85 feet. Shipments can be made promptly

Inland Steel Company
First National Bank Bldg. CHICAGO

WORKS:
Indiana Harbor, Ind., and Chicago Heights, Ill.

BRANCH OFFICES:
Dallas, Denver, Detroit, Los Angeles, Milwaukee, St. Louis, Kansas City, Mo., St. Paul, San Francisco, Seattle

Laclede Bars for Reinforcing Concrete

Many buyers now take advantage of facilities at mill by ordering bars cut to length, bent to shape, and tagged—ready for placing.

For Particulars Address

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Works:
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Chicago Office:
208 S. La Salle St.
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for CONCRETE REINFORCING

We can meet your Reinforcing Steel Requirements. This means not only quick shipment from the mills but co-operative service for rapid transportation. If you want to know just what your exact cost will be, send us the Blue Prints and we will give you a lump sum bid on all the steel sheared to lengths, bent to specifications and delivered to the job,

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It is demonstrated beyond doubt that to make concrete roads proof against heavy motor traffic, weather and time, a fabric of steel must be incorporated in the concrete.

Several great states have so ruled.

American Steel & Wire Concrete Company's Reinforcements fulfills every engineering requirement.

Send for our book on road building.

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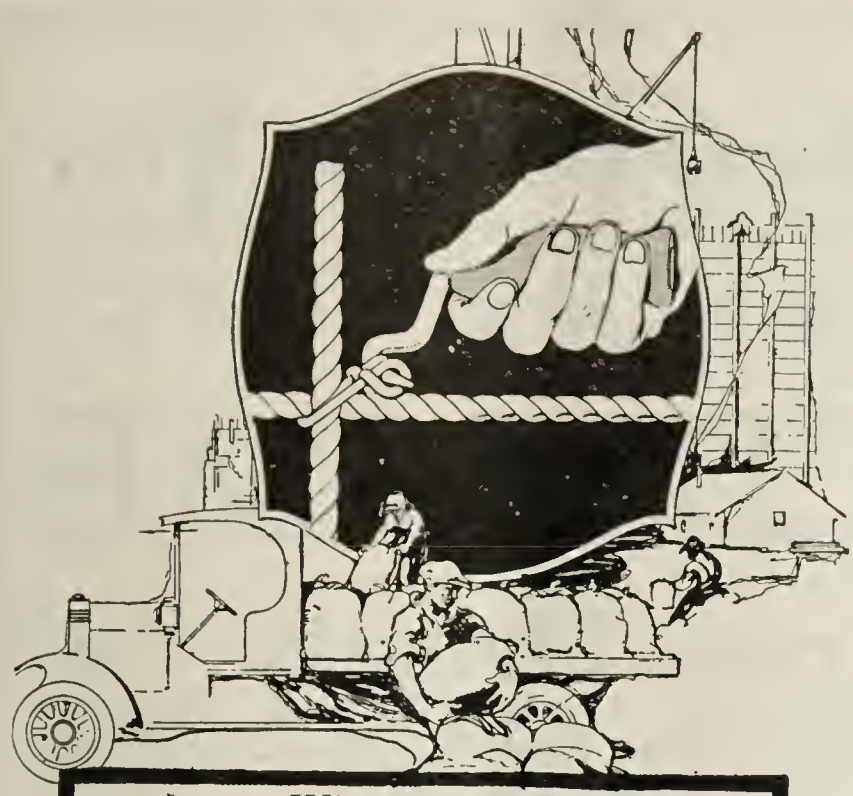

Bates Wire Ties Now Sell At Less Than Pre-War Basis

Write for the new prices on Bates Wire Ties—they cost you less than ever before—actually priced lower than during the pre-war period.

If you are using the Bates System of Tying, stock up at the new prices.

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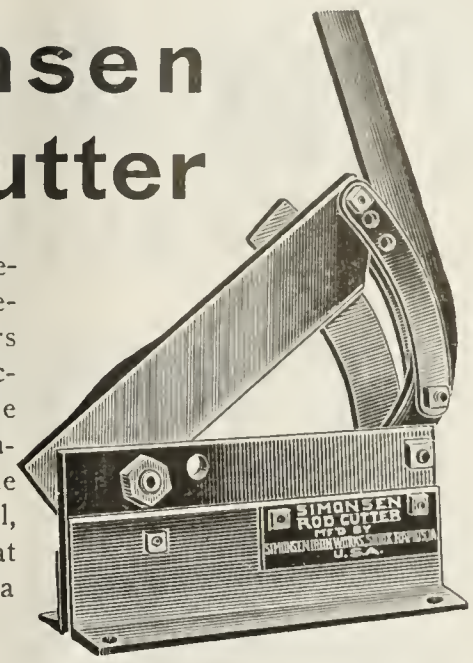
BATES SYSTEM FOR FILLING & CLOSING BAGS

Simonsen Bar Cutter



Is designed especially to meet the requirements of builders in concrete construction needing a portable shear for cutting reinforcing bars on the job. It's a practical, low-priced shear that will pay for itself in a short time.

NON-BREAKABLE STEEL BODY

Cutting Jaws are of the "welded in" type, our own patented design. Lower or stationary jaw has a keen edge of hardened tool steel and is practically indestructible. Upper jaw does the actual cutting and is hinged at rear end on a heavy case hardened steel pin. It's reinforced.

Made in three sizes. No. 10 weight 75 lbs. Capacity ¾ in. round or ½ in. square twisted. No. 11 weight 125 lbs. Capacity 1 in. round or ¾ in. square twisted. No. 12, weight 175 lbs. Capacity 1¼ in. round or 1 in. square twisted. Shipped set up complete with suitable lever.

Ask your supply dealer or write us for full information.

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Sioux Rapids **Iowa, U. S. A.**

Contractors can't afford to be without

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It's made in 2 sizes, and is guaranteed to bend bars as follows: No. 2 bends cold reinforcing bars including 1⅛ in. round or square. Price $30.00. No. 3 bends cold reinforcing bars including 1¼-in. round or square. Price $35.00.

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Bale your sacks up tight and right
Keep them baled up all the time. If you have one of our handy sack balers you will do this. We manufacture a cleaner that cleans. Write us for prices and further information.

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There are many years of manufacturing experience back of every Leschen Wire Rope, which insure a product that is uniform and durable.

We make high grade Wire Rope for all purposes. If you will tell us how you use wire rope we shall be glad to suggest the correct rope for the work.

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A. Leschen & Sons Rope Co.

ST. LOUIS, U. S. A.

New York Chicago Denver
San Francisco

For Better Concrete, Stronger Mortar—use HYDRATED LIME

Increases Concrete Density

By virtue of its ability to fill the voids, Hydrated Lime increases the density of concrete. The mass becomes more watertight—practically impervious to water. Honeycomb and other structural weakness are also prevented. Hydrated Lime promotes intimate contact of the concrete mass with the forms and produces smooth, pleasing exterior surfaces.

Other Reasons Why You Should Specify and Use Hydrated Lime

because

1. Makes the mixing of Portland cement concrete more easy, inasmuch as it lubricates the sand grains and coarse aggregates.
2. Renders the concrete mix plastic enough to flow freely and smoothly with a minimum of excess water.
3. Makes the concrete easier to work after it is deposited in the forms, thus eliminating labor usually required for spading and tamping against the forms.
4. Eliminates the tendency toward cracking, because it minimizes alternate expansion and contraction due to moisture changes.
5. Promotes uniformity of the mass concrete by producing a colloidal or jelly-like medium through which the rock and matrix do not segregate, thereby producing a stronger concrete.
6. Materially and directly increases the ultimate compressive strength and efficiency of the concrete, by virtue of its ability to hold water in mechanical suspension and thus supplying the necessary moisture required by Portland cement in order properly to set and attain its maximum strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

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Marblehead Lime Co., Chicago—Kansas City

Louisville Cement Co., Louisville, Ky.

Lee Lime Co., Lee, Mass.

White Marble Lime Co., Manistique, Mich.

Glencoe Lime & Cement Co., St. Louis, Mo.

Ste. Genevieve Lime Co., St. Louis, Mo.

Rockland&RockportLimeCorp. New York—Rockland, Maine—Boston

Hunkins-Willis Lime & Cement Co., St. Louis, Mo.

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

National Lime & Stone Co., Carey, Ohio

Ohio Hydrate & Supply Co., Woodville, Ohio

Woodville Lime Products Co., Toledo, Ohio

Merion Lime & Stone Co., Norristown, Pa.

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Vermarco Lime Co., West Rutland, Vt.

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ENGINEERS
BUILDERS OF CEMENT PLANTS
FIRST NATIONAL BANK BUILDING
CHICAGO, U. S. A.

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Reports, Examinations and Analyses of Raw Materials for Cement Consultations Solicited
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THE KRITZER COMPANY
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Hydrating Lime—The Kritzer Way
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Daniel B. Luten
INDIANAPOLIS
Designing and Consulting Engineer
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Associate Engineers in each State

BECAUSE WE SPECIALIZE ON
Lock Seam Pipe with the smooth inside surface, having already furnished large quantities for Potash Recovery plants, we are able to give especially careful attention to the construction of this class of Pipe.
Robertson Bros. Mfg. Co., Chicago

PEERLESS ENGINEERING CO.
Layouts, specifications on Water Supply, Water Power, Suburban Electric Lighting and Power Plants, Designs for Oil or Gasoline Engines and Machinery, Industrial Buildings, Millwrighting, Supervision of Erection, Etc.
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C. A. P. TURNER
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CONSULTING ENGINEER
Reinforced Concrete and Structural Steel Bridges, Buildings and Manufacturing Plants
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By Graduate Chemist. Experience in Cement Industry, Chief Chemist, and Construction Work. Also sales experience in allied line. Would consider position in either Operating or Sales Departments. Address Box 47, c/o Cement & Engineering News, 22 Quincy St., Chicago, Ill.

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WANTED

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Mechanical Engineer, 35 years old, 12 years' experience in Cement Plants, desires position as Chief Draftsman, Engineer, or Assistant to Superintendent. Address Box 84, c/o Cement & Engineering News, 22 Quincy St., Chicago, Ill.

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Some people will buy only new electric motors, paying the highest prices without questioning. But aren't you willing to spend two cents to find out whether you can get a used motor of that same type from us for much less? If the motor is of good design won't it do your work just as well if bought from us—as though bought new?

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1	50	Westinghouse	750
3	50	Crocker-Wheeler	625
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2	50	Westinghouse	525
1	50	Westinghouse	450
1	60	General Electric	800
1	60	Northern	650
1	75	Westinghouse	850
1	75	Burke	375
1	90	Western Electric	525
1	90	Northern	450
1	100	Allis-Chalmers	850

H.P.		3 Phase, 60 Cycles	Speed
2	60	Western Electric	900
1	75	Gen. Elec.	1800
1	75	Gen. Electric, slip-ring.	900
2	100	Gen. Elec.	1800
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Every machine sold is overhauled "like new"

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Motors AC and DC
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RANSOME MIXER

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One Yard

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Several Tip-over and Bottom Dump Buckets, also some small construction equipment.

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Completely equipped Sand and Gravel Washing Plant. Unlimited supply of material. Capacity of plant 50 cu. yds. per hr. 165 miles paved road to be built within two years within a radius of 60 miles. Only plant in territory. Other business interests reason for selling. This is a money maker. Address Box 17, care Cement & Engineering News, 22 Quincy St., Chicago, Ill.

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Will never be cheaper

At our prices we should sell a tank every thirty minutes!
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New and used tanks in any part of the country.

Steel storage and pressure tanks.
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Steel and wood towers and tanks.
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Tanks for oil, gasoline, tar, molasses, coal, sand, feathers, acid, air, gas, etc.

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Largest dealers in tanks.

THE CURTISS-WILLIS CO.
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8—Ton
Vulcan Steam Dink
24-in. Gauge. First class condition.
Shop No. 542.
Can be inspected at Minneapolis
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NITRO, WEST VIRGINIA
Operating the City of Nitro

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1—No. 4 and 1—No. 6 Allis Chalmers Gyratory. First Class Shape.

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Dump Cars, Locomotives, Rails.

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From the $87,000,000 Old Hickory Plant

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8 6 H.P. Stover Gasoline Engines.
3 10 H.P. Novo Vertical Gas Engines.
1 3 H.P. F. M. Type 2.
1 5 H.P. F. M. Type 2.
1 15 H.P. Lambert Horizontal.
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15 Winches.
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5 Bottom Dump Cement Buckets.
3 Jeffrey Loaders.
Mixers, Steam and Gasoline Driven Wheelbarrows.
Concrete Buggies.
2000 tons 67½ lb. Rail, Russian Section.
2000 tons 80 lb. Rail, A.S.C.E. Section.
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36 Storage Battery Locomotives, 36-in. gauge.
5 Dinky Engines.
10000 Steel Cots, single and double deck.
30000 Mattresses, single and three-quarters.
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Thousands of other articles.

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Nashville Industrial Corporation
Jacksonville, Tenn.

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Revolving Steel Cylinder about 20′ to 30′. Write details and price.
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Continuous pulverizing flint pebble mill for grinding feldspar, give full description and lowest cash price.

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Shovel No. 3 with skimmer scoop built with enclosed cab. Shop No. 405. This shovel has only been used in light sand work during the summers of 1918, 19 and 20. First class condition. At present at Poughkeepsie, N. Y.

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Crushing Plant
$5750.

1—No. 5 Gates Gyratory, reg. drive.
2—No. 6 Gates Gyratory, reg. drive.
1—No. 6 Gates L. H. drive.
1—Revolving Screen, 48 in. x 22 ft.
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1—14 x 24 Horizontal steam engine.
1—Pump 1 Feed water heater, all belting, shafting, pulleys and 2 overhead hoists.

Also

15—40 in. gauge, 2-yard, all steel, special built end dump cars, $200 each.

Also

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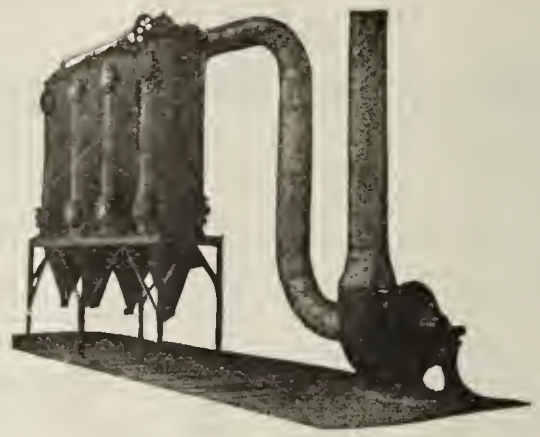
2—710 C.F.M. Class WJ3 Sullivan Angle-Compound Belt Driven Air Compressors. Practically good as new. Immediate shipment.

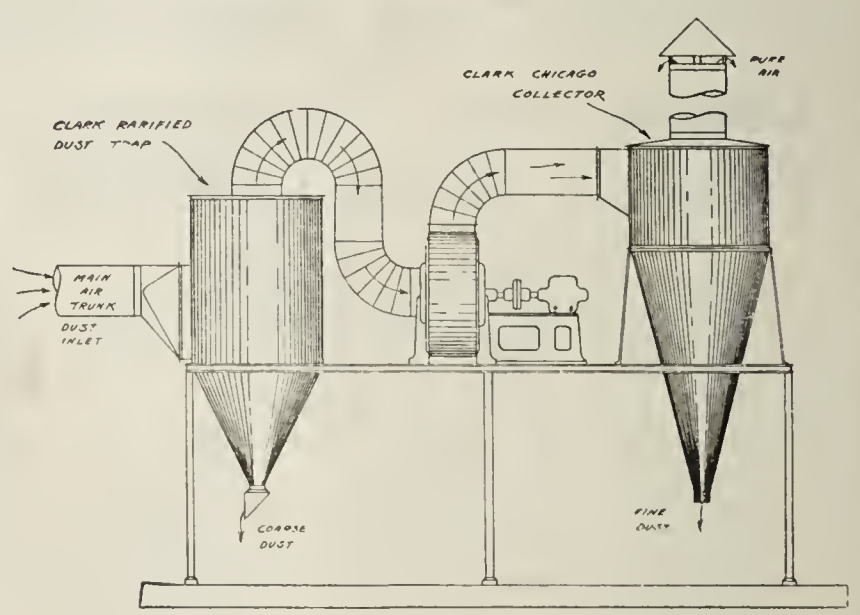
A. McMILLAN
628 Monadnock Block CHICAGO, ILL.

NORBLO
SUCTION FILTER



The NORBLO Suction Filter is installed in batteries of cylinders from two up to any number which may be required. Each cylinder has twelve closely woven cloth bags which strain the dust laden air, making escape of any material impossible. Air and dust is drawn into bottom hopper of machine and strained through the bags, the clean air passing out of the manifold at the top, thence to the fan. Fan always handles pure, clear air, free from all impurities. More material can be recovered with this equipment than with any other known medium.

OUR ALL METAL SYSTEM



The Clark All Metal System consists of Clark Chicago Collector, Fan and Adjustable Air Separator. This system can be used for the collection of dust of any kind. Occupies minimum space. Durable and efficient. The Clark Adjustable Air Separator insures longer life to the fan by separating the abrasive dust ahead of the fan, making two classifications of dust collected.

All Metal Systems reduce your fire and explosion hazards, insure longer life to your machinery and a better day's work from your employees.

Write us if you are interested in Pneumatic Conveying or Dust Recovery Problems

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Dust Collecting Engineers
Fisher Bldg., Chicago, Ill.

More Popular Than Ever

The Bradley Hercules Mill

New installations every month and wonderful reports from all old users indicate that this mill will soon displace all other preliminary pulverizers in cement mills.

Built for the Preliminary Pulverizing of Cement Materials

In Operation at the Largest and Most Successful Cement Plants Since 1913 —More Popular Than Ever and More Successful

13 Mills Sold to Pennsylvania Manufacturers
Other Installations in Tennessee—New York—North Carolina—Illinois—Oklahoma—California—Washington—Cuba—Argentine

It's the largest preliminary machine manufactured adapted for pulverizing Cement Rock, Limestone or Clinker.

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It's a Wonderful Labor and Power Saver

Our Engineers will gladly show you how this mill will reduce your present operating costs, using your present tube mill equipment, and increase your output.

BRADLEY PULVERIZER COMPANY

Works: Allentown, Pa. BOSTON, MASS.

Manufacturers of Pulverizing Machinery for 30 Years

CEMENT AND ENGINEERING NEWS

with which Gravel & Stone Magazine is Incorporated

22 Quincy Street, Chicago.

(PUBLISHED MONTHLY)

William Seafert, *Publisher and Editor*

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Advertising copy or changes in ads. must be in this office by the 25th of each month, as hereafter our magazine will appear on the 5th of the following month

Advertising Rates Sent on Application

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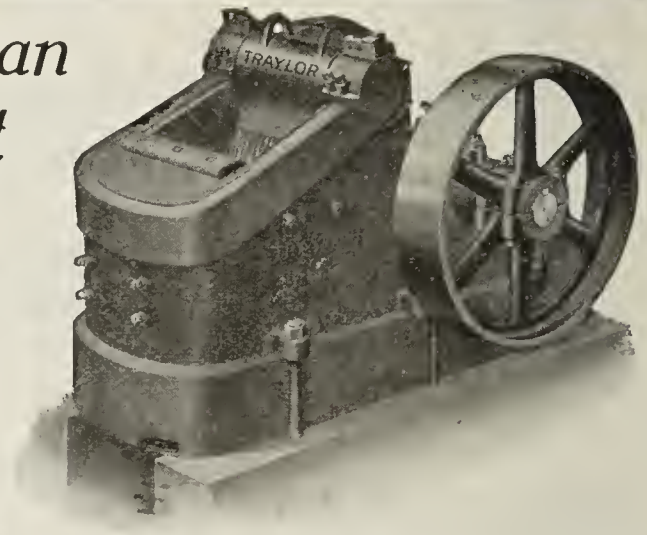
Traylor "Bulldog" Jaw Crushers Mean a Saving at Any Crushed Stone Plant



One method of designing crushers is to make them so massive throughout that it is practically impossible for them to be subjected to strain. Yes, they crush but the cost of operation is terrific.

Traylor Engineers strove to design the lightest yet the strongest crusher possible, that's why the frame of every "Bulldog" Jaw Crusher has a steel band shrunk on it top and bottom and all are equipped with the "Bulldog" Toggle system, the pitman of which is by far the lightest yet strongest of its kind being; made of wrought-steel tension members.

And it's this fine balance of weight and strength that makes the "Bulldog" crusher so economical to the user. Ask your neighbors about the power costs of their "Bulldog" Crushers.

TRAYLOR ENGINEERING & MFG. COMPANY, Allentown, Pa.

New York *Chicago* *Pittsburgh* *Los Angeles* *Spokane*

Truck and Tractor Division, Cornwells, Bucks Co,, Pa.

For Immediate Delivery

10 in. x 20 in. Type "A" Jaw Crusher
14 in. "Bulldog" Gyratory Crusher
No. 7½ Gyratory Crusher
36 in. x 16 in. Type "A" Crushing Roll

And the Same Economy That's Found in Traylor "Bulldog" Crushers is Built in Traylor Motor Trucks and All Purpose Tractors

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CHARGING and discharging are an uninterrupted process with VULCAN Rotary Kilns. Wet or crumbly materials are easier handled because there are no grates to clog. Perhaps your industry is of the kind—

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Stone Driers for Limestone
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Sulphate Drying and many others

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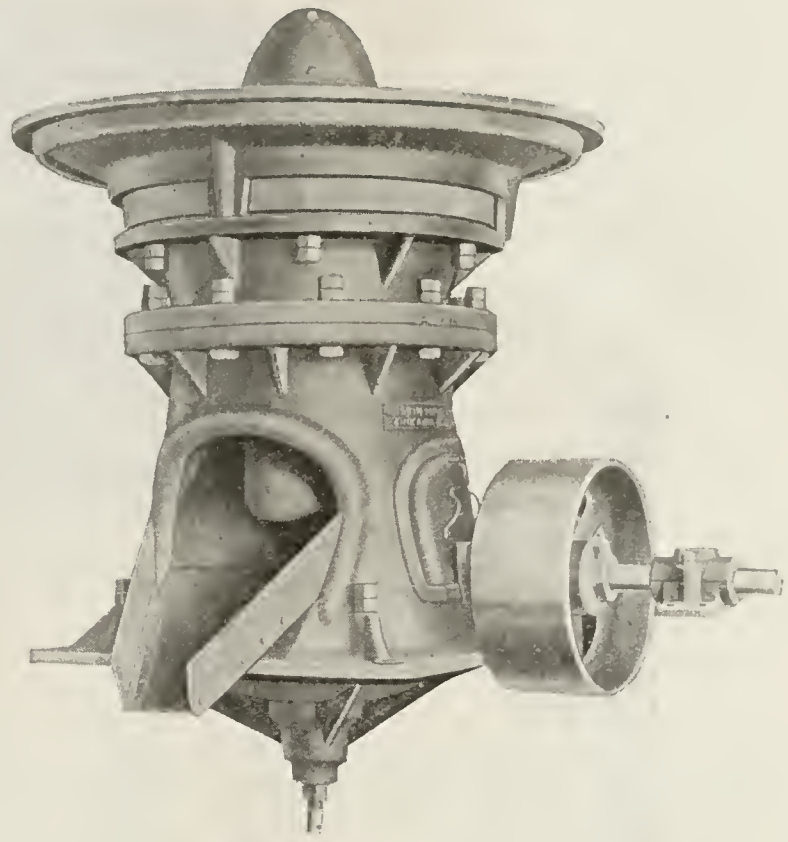
Established 1849

1740 Main Street Wilkes-Barre, Pa.



Austin Gyratory Crushers

Stationary and Portable Types

are so designed and constructed as to insure their giving real service and satisfaction over a long period of years.

Exclusive Austin features are responsible for their high production and low upkeep records which combine to make an Austin Crusher.

A Mighty Fine Investment

Catalog No. 28-D describes these dependable crushers in detail and Elevators, Screens, Cars, Hoists, Bins, etc. as well. It also shows layouts of many successful plants of various sizes and is well worth a place in your file.

Austin Manufacturing Co.

New York CHICAGO San Francisco

CANADIAN AGENTS
Canadian Fairbanks-Morse Co., Limited:
Winnipeg, Calgary, Saskatoon

ALMACOA EXPORT DEPARTMENT ALLIED MACHINERY COMPANY OF AMERICA ALMACOA

Analyze Your Drilling and Blasting!

Our new Blast Hole Catalog B-46 (96 pages) will help you.

The day of poking a hole down with a rivet header or a converted hay bailer is past.

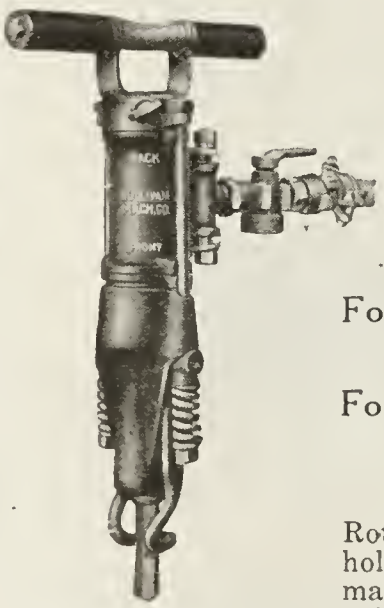
Drilling, being the first step in stone production, is the most important. One cent or one half cent per ton cost saved in this operation often eliminates competition.

With Cyclone No. 14 Drills on the job and Cyclone Service in reserve, your drilling and blasting troubles fade—and your costs will be right!

THE SANDERSON-CYCLONE DRILL CO.
ORRVILLE, OHIO.
Eastern and Export Office: 30 Church St., New York.

ROTATORS

FOR ALL-AROUND QUARRY DRILLING



For block holing
Use Rotators

For shallow holes in trenches
Use Rotators

For deep holes on benches
Use Rotators

For light tripod or quarry bar drilling
Use Rotators

Rotators weigh 38 lbs., drill holes to 14 feet readily, and may be had in seven models to suit the work to be done.

Rotators are hard on the rock, but easy on the runner.

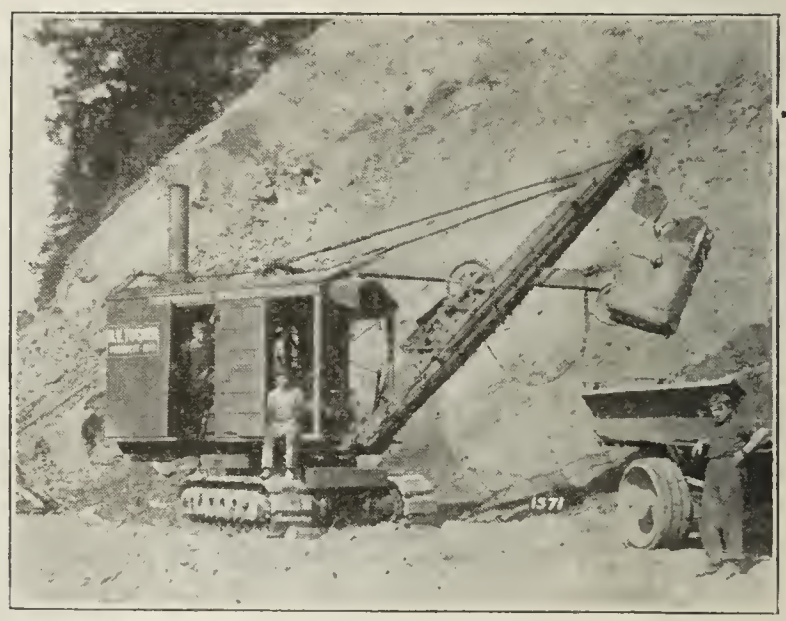
Bulletin 1770-J

SULLIVAN MACHINERY COMPANY
418 PEOPLE'S GAS BLDG. CHICAGO, ILLINOIS U.S.A.

DOMESTIC SALES OFFICES:
Birmingham, Boston, Butte, Claremont, N. H., Cleveland, Dallas, Denver, Duluth, El Paso, Huntington, W. Va., Joplin, Juneau, Knoxville, New York, Pittsburgh, St. Louis, Salt Lake, San Francisco, Spokane

FOREIGN SALES OFFICES:
Algiers, Brussels, Calcutta, Christiania, Durban, Natal, Havana, Lima, London, Madrid, Mexico City, Paris, San Juan, Santiago, Shanghai, Sydney, N. S. W., Tokio, Tunis, Turin, Vancouver

SULLIVAN PRODUCTS
Air Compressors; Air Lift Pumps; Diamond Drills; All-Hammer Drill Sharpeners; Drill Steel Furnaces, Forge Hammers, Ironclad Coal Cutters, Rock and Hammer Drills; Quarrying Machinery, Contractors for Diamond Core Drilling.



When investing your money you will do better with

OSGOOD

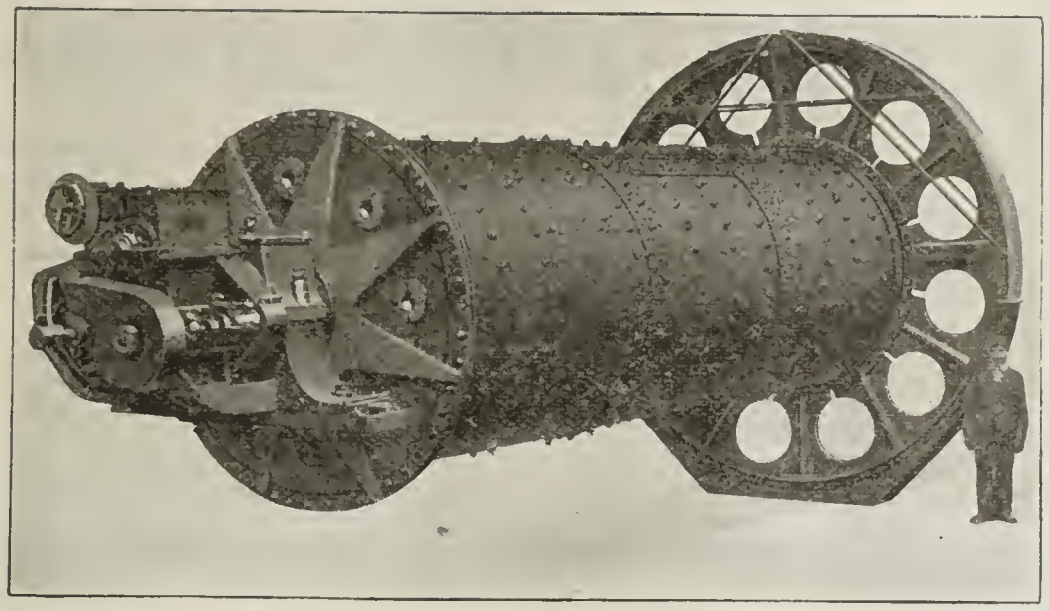
QUALITY—SERVICE

Investigate their superior features now.

WRITE, PHONE OR WIRE

Revolving Steam Shovels ¾ and 1 yard.
Railroad Type Steam Shovels 1½-6 cu. yards.

THE OSGOOD COMPANY, MARION, OHIO, U.S.A.



If you have any grinding problems, the Compeb Mill should receive thorough consideration. This mill designed to reduce any grindable material either wet or dry from sizes 1½" and under to any commercial fineness.

USE THE COMPEB MILL
TO REDUCE GRINDING COSTS

ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS. U.S.A.

SPECIAL

We have in stock for immediate shipment all or any part of:

1,500 FT. 20-INCH O. D.
WELDED PIPE

⅜ inch wall-plain ends.
Random lengths 16 to 20 ft.
Of great value for culverts in road building.
Attractive prices will be named to those interested. Write us for quotations subject to prior sales.

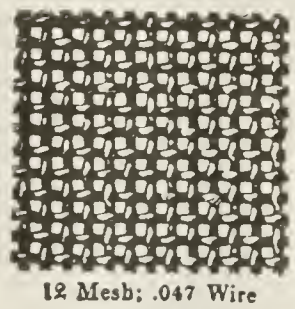
SHEETS

Our complete stock of Galvanized, Black and Blue Annealed Sheet Steel and Zinc, PLAIN or CORRUGATED enables us to give prompt attention to all orders and inquiries received.

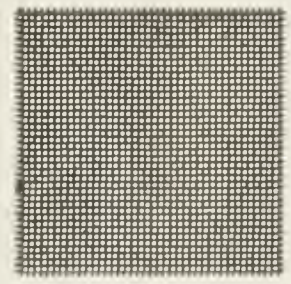
THE SYKES COMPANY
FABRICATED STEEL PRODUCTS
930 W. 19th Place CHICAGO

Cleveland Double Crimped
WIRE CLOTH

2½ Mesh; .105 Wire



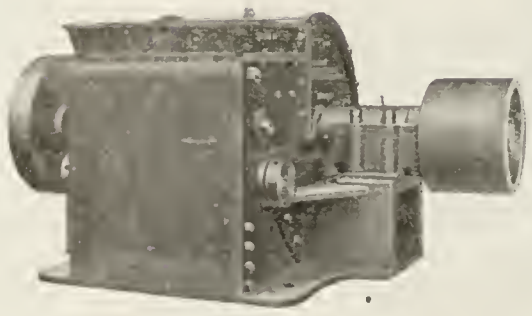
12 Mesh; .047 Wire



40 Mesh. .0135 Wire

You should use our screens because a uniform fineness of screened product is assured by an even, accurate mesh. This is a characteristic of "Cleveland" Double Crimped Wire Cloth.
Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

The Cleveland Wire Cloth & Mfg. Co.
3579 E. 78th Street, CLEVELAND, OHIO



THE TERRIFIC STRENGTH IN THE
DIXIE SWING HAMMER CRUSHER

is an assurance of exceptional economy and dependability in your crushing and pulverizing.

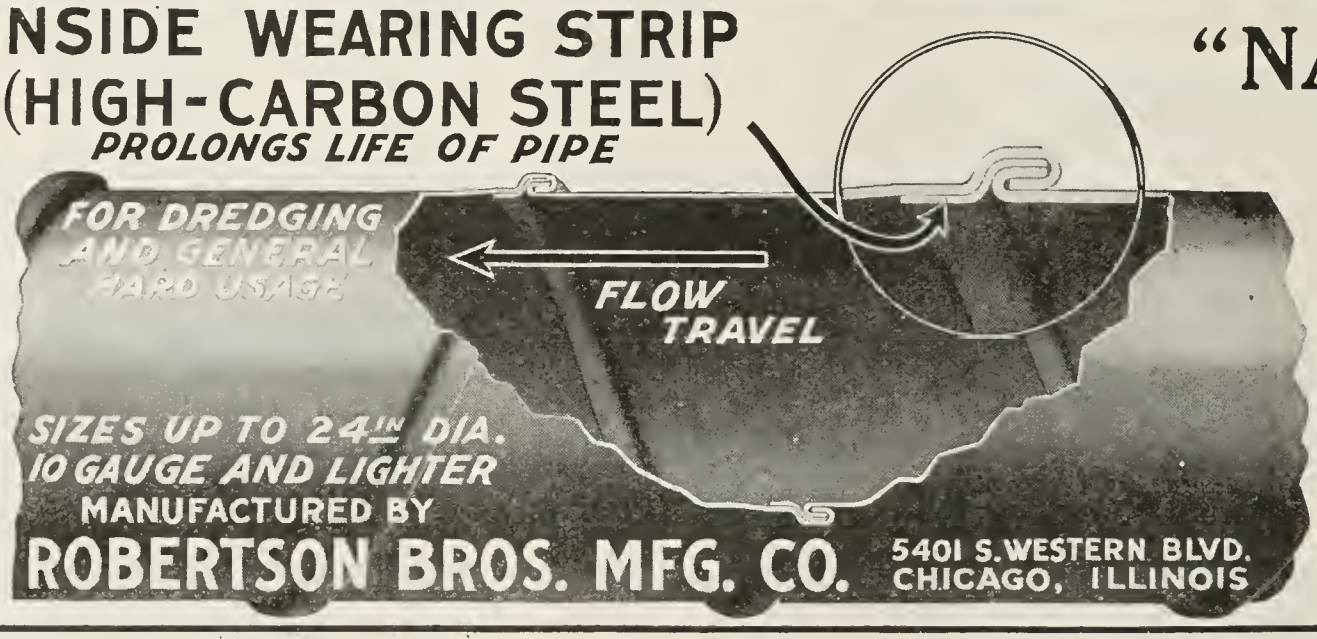
The Dixie Crusher is the result of 30 years' experience in the manufacture of all kinds of crushing and grinding machinery and is a perfect product in every respect.

It is simple, durable, efficient, turns out a uniform product at a minimum cost in power and maintenance, built in any size from one ton to 500 tons per hour.

Catalog will be sent upon request.

DIXIE MACHINERY MFG. CO.
3661 MARKET ST. ST. LOUIS, MO.

INSIDE WEARING STRIP (HIGH-CARBON STEEL)
PROLONGS LIFE OF PIPE



"NAYLOR" LOCK-SEAM SPIRAL PIPE

Costs Less—
Costs Less to Install—
Costs Less to Maintain

Patents Pending.

AJAX CONVEYOR BELTING

IN the Ajax Brand Rubber Conveyor Belting we offer a first class belt for ordinary conveying purposes. The duck and rubber is of good quality and will compare favorably with the good belts now on the market. We make it with a flat or convex surface, and with a cover varying in thickness from one-sixteenth inch to one-fourth inch. For conveying coal, sand, gravel, stone, etc.

Advise us regarding your installations. We make belts for every purpose.

Conveyor Belts *Transmission Belts* *Packing*
Elevator Belts *Hose—all Kinds* *Valves, etc.*

The Gutta Percha & Rubber Mfg. Co.
301 West Randolph Street
Chicago, Ills.

New York Boston Seattle
San Francisco

Quality of Taylor Mesaba Steam Shovel Chain Is Shown by Its Service Record

TAYLOR MESABA

A large number of contractors and cement, lime, crushed stone and sand and gravel producers—both large and small—have found from actual experience that the dependable service always obtained from Taylor Mesaba Steam Shovel Chain enables them to keep their output up and their operating expense down.

Taylor Steam Shovel Chain is a product of many years of practical chain making.

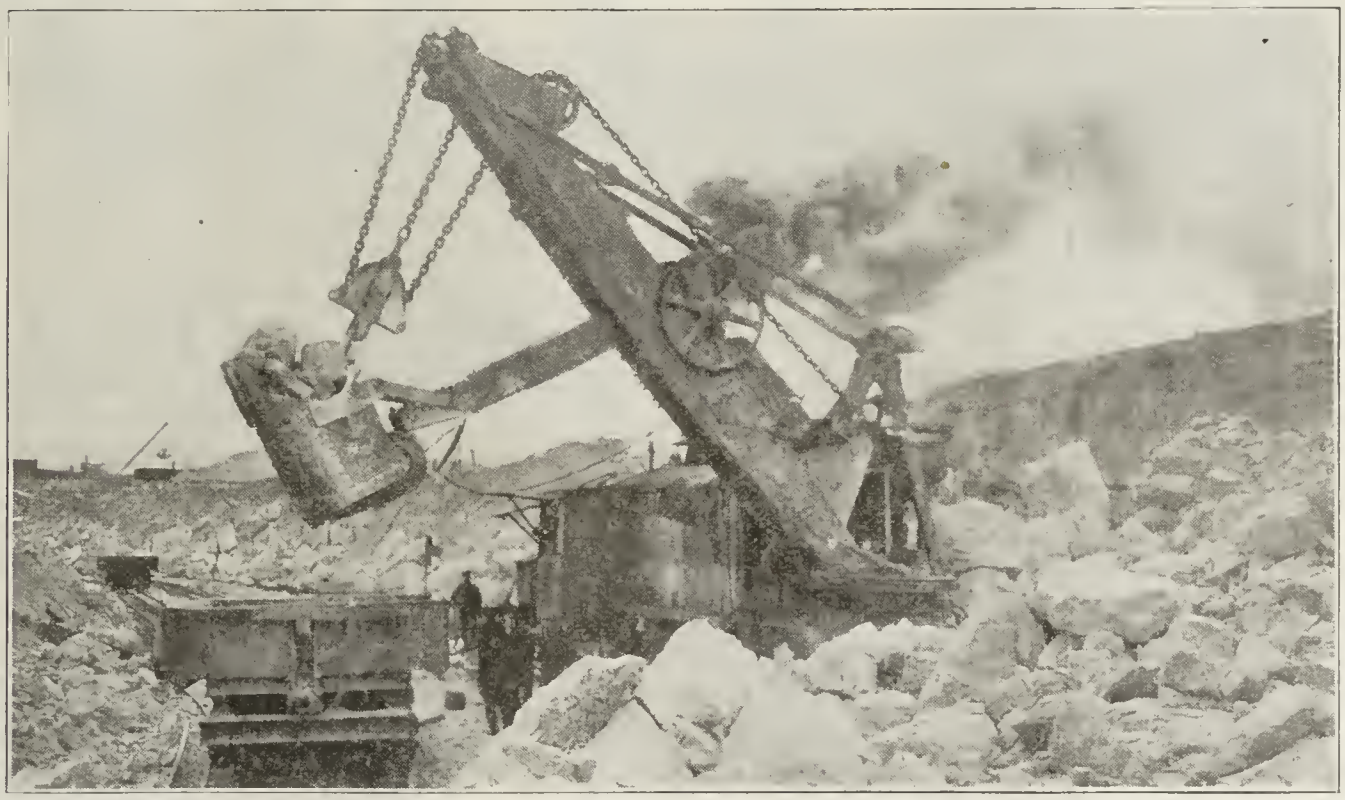
Every individual link is correct in size and shape, smooth finish, swedged to long taper, welded on end, with length of weld not less than twice the diameter of the iron.

These details are watched by master workmen, whose life work is the making of good chain.

Sizes carried in stock—¾", ⅞", 1", 1⅛", 1¼", 1⅜", 1½", and 1⅝". When you need chain for stram, order Taylor Mesaba.

S. G. TAYLOR CHAIN CO.

144 SO. DEARBORN ST. CHICAGO



For FIRE BRICK and DUST

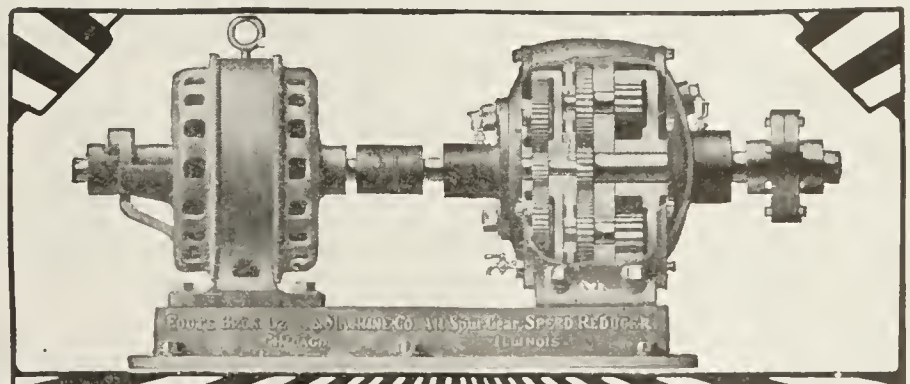
Specify

CRESCENT QUALITY

THE UTMOST IN
FIRE CLAYS

CRESCENT REFRACTORIES CO.

Curwensville, Clearfield Co., Pa.

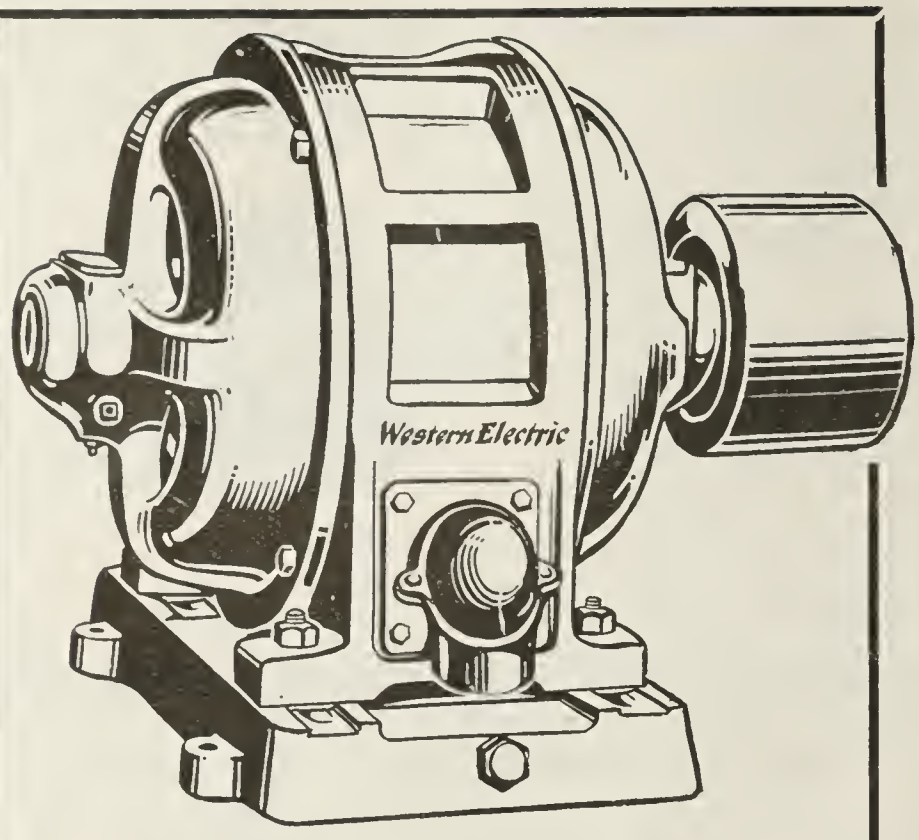


FOOTE SPEED TRANSFORMERS

Write to us, state the conditions that exist in your plant, and get the advice of our engineering department.

FOOTE BROS. GEAR & MACHINE CO.,

228-238 N. Curtis St. Chicago, Ill.



DID YOU EVER STOP TO CONSIDER

That we have spent years of our time on your electrical problems? Years of untiring efforts which embraced university training, laboratory tests on material, plant analysis, etc? We offer you today the services of men from our organization who can carry your problems through to a successful issue, can meet your emergency just the same as we met others.

We are specialists in Motor Designing, Motor Building, Coil Building and Power Surveys. The knowledge we have gleaned after making a thorough study of cement mill plants and their operation, the experience we have gained through making the cement industry our choice of operations and our factory facilities we offer you now. We know we can be of aid to you and we also know you have your electrical problems to solve.

An engineering specialist will answer every inquiry of yours and answer it in an understandable way. Our service extends all over the United States.

Lansing Electric Engineering Co.

All the Name Implies

Lansing, Michigan

ANDERSON IMPROVED TYPE K

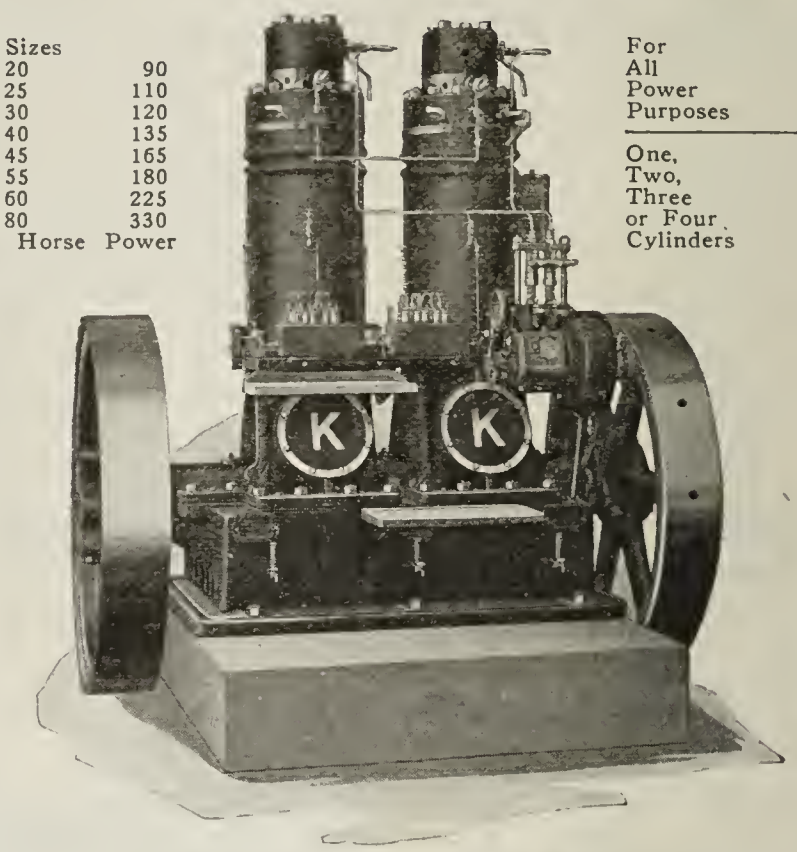
Medium Compression, Dry Mixture Oil Engine

Sizes	
20	90
25	110
30	120
40	135
45	165
55	180
60	225
80	330

Horse Power

For All Power Purposes

One, Two, Three or Four Cylinders



Illustrating 60, 90 and 110 H. P. Type K.

This is The Oil Engine looked forward to for these many years. A happy compromise between a Diesel and a Semi-Diesel. It has most of the advantages of both types with their disadvantages absent.

WRITE FOR OUR LITERATURE

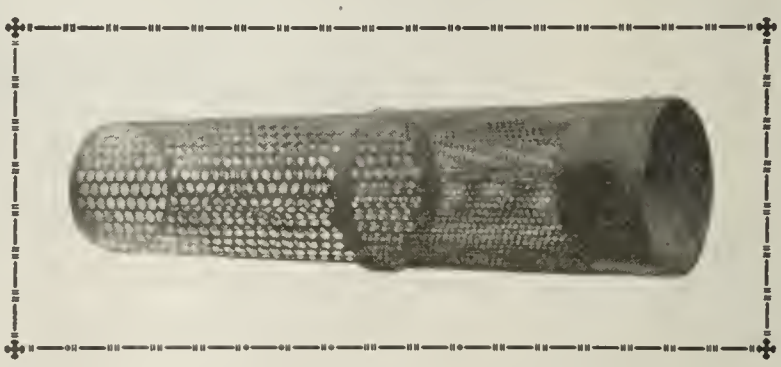
ANDERSON FOUNDRY & MACHINE COMPANY

A.F. & M. Co.

FOUNDED IN 1872 CAPITAL $1,400,000.00

ANDERSON, INDIANA, U.S.A.

PERFORATED SCREENS

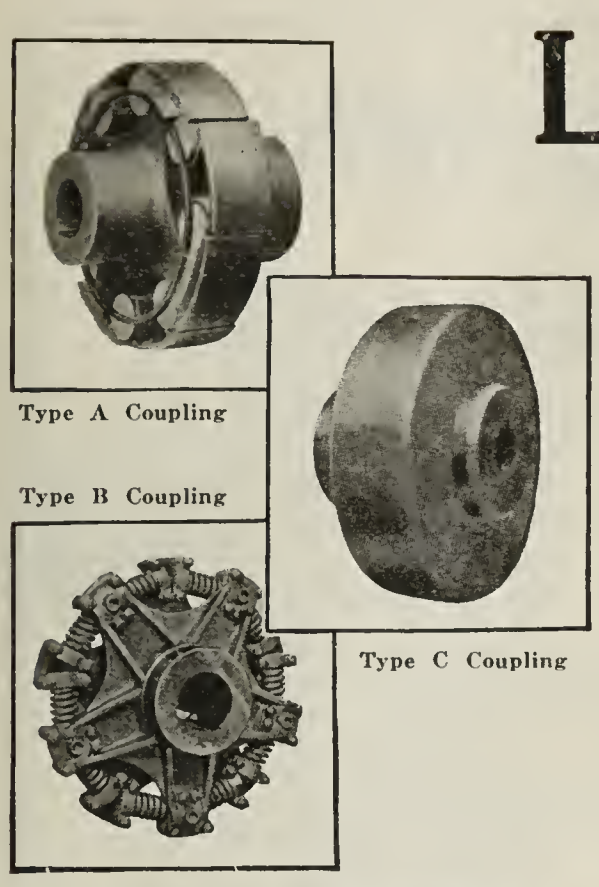


Made to suit your requirements. Advise diameter, length, thickness and size of perforations required.

NORTMANN DUFFKE CO.

1220 27TH AVE.

MILWAUKEE - - WIS.



Type A Coupling

Type B Coupling

Type C Coupling

Lengthen the Life of Machinery

In a rigidly connected driving and driven unit, the life of the equipment is directly proportional to the vibration and peak load.

Flexible couplings absorb vibration and peak load shocks, thus greatly increasing the life of the equipment.

Nuttall flexible couplings are built in three distinct types—A, B, and C, in order that any particular service condition may be exactly met.

Write for Catalogue

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

Nuttall

BATES
VALVE BAGS
INSURE SAFE DELIVERY

If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

THE VALVE BAG CO. OF AMERICA

TOLEDO, OHIO

Sand Lime Brick Machinery

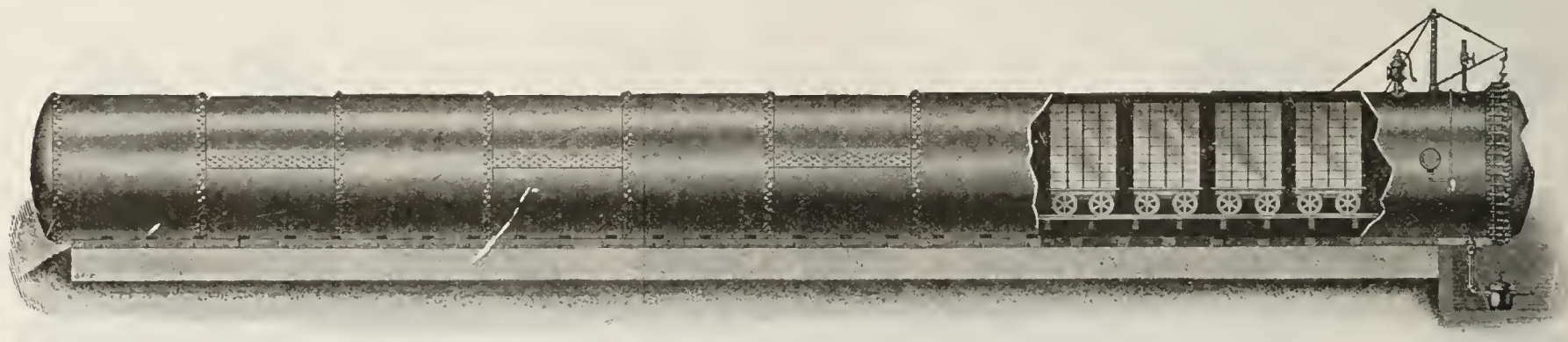
Our complete line of Sand Lime Brick Machinery makes it possible to secure just that machinery which is required to make your plant a success. We favor no particular type of machinery but are guided by the needs of the customer. Our wet and dry grinding mills have transformed a number of unsuccessful plants into dividend producers, while our Presses, Mixers, Hardening Cylinders and other equipment are of equal quality. We can exactly meet the demands of any manufacturer with a quality of machinery which will operate at a profit with a minimum amount of attention and expense.

Correspondence solicited

The Hadfield-Penfield Steel Co.,

WILLOUGHBY, OHIO

Formerly The American Clay Machinery Co.



BUCYRUS

Bucyrus Steam Shovels are built with the strength and ruggedness to dig rock with the lowest cost of maintenance.

Bucyrus Steam Shovels are built in sizes for every requirement.

Immediate delivery on railway type shovels.

Write for Bulletin A. G.

We build all sizes of steam and electric shovels for quarry service—revolving shovels—dragline excavators—dredges, etc.

New York
Chicago
Birmingham
Minneapolis
Cleveland

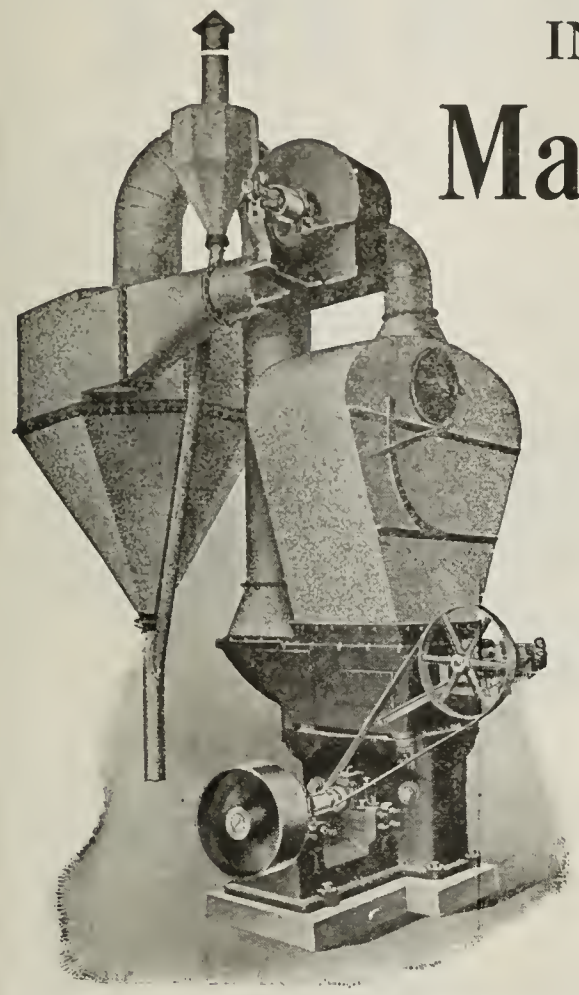
BUCYRUS COMPANY

Denver
San Francisco
Salt Lake City
Portland, Ore.
London, England

273

SOUTH MILWAUKEE, WISCONSIN, U.S.A.

Complete Grinding IN ONE Machine



In successful use grinding Cement, Clinker, Limestone, Coal

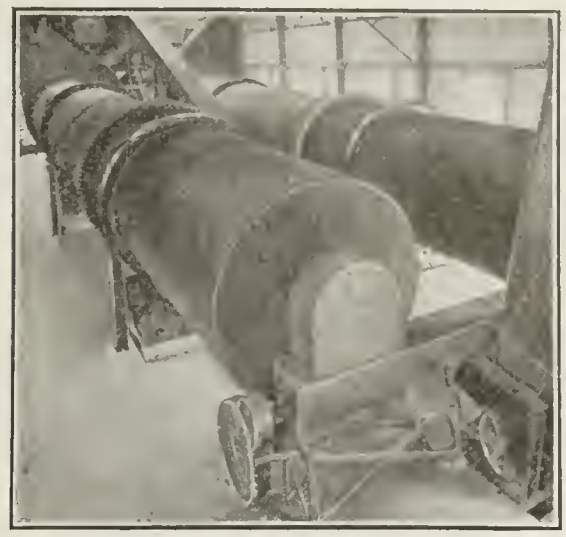
INSTANT REGULATION OF FINENESS

NO DUST

Send for Circular

THE BONNOT CO.
CANTON, OHIO

Ruggles-Coles Dryers



A Dryer That Utilizes Both Conductive and Convective Heat

Conductive heat—hot inner shell—dries the material as it rests on the inner shell.

Convective heat—hot gases—further dries and also carries off moisture as the material drops through the gases during the rotation of the dryer.

These are the two most important forms of heat. Both are utilized to advantage in Ruggles-Coles dryers.

There are 7 other types of Ruggles-Coles dryers, each operating on a principle that applies to specific requirements. If you have a drying problem, the chances are that one of these types was developed to meet similar requirement.

RUGGLES-COLES ENGINEERING CO.
120 Broadway New York

Truscon Wire Mesh for Reinforcing Concrete Roads

Truscon Wire Mesh is a superior reinforcement, especially made for concrete roads. The main wires extending across the pavement are 6" apart, and are of varying size to meet all conditions.

Truscon Wire Mesh is furnished either coiled in rolls or in flat sheets cut to length. The use of the flat sheets saves labor and high field costs of uncoiling. Sheets eliminate entirely the necessity of fastening the reinforcement in place.

Properties of Truscon Wire Mesh

No.	Area per Ft. Main Wires.	Area per Ft. Stay Wires.	Area End Wires Each.	Weight per Sq. Ft., Lbs.
5.....	.050	.010	.013	.22
6.....	.066	.010	.017	.28
7.....	.070	.010	.018	.29
8.....	.080	.010	.020	.32

This material is furnished either in rolls with an 18-inch core or in flat sheets cut to length.

Main wires are spaced 6 inches on centers; cross wires 8 inches on centers.

Rolls 61¼ inches wide; net width 60".

20 rods of material per roll—weight approximately 450 pounds.

5 sheets per bundle—weight 100 to 150 lbs.

TRUSCON STEEL CO. TRUSCON BUILDING PRODUCTS

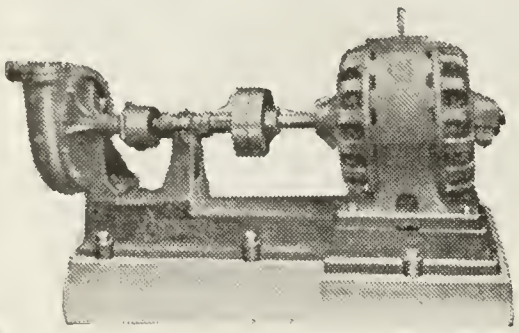
Truscon Steel Company
Youngstown, Ohio

Warehouses and Representatives in Principal Cities

AMERICAN

TRADE MARK REG'D. U.S. PAT. OFFICE

PUMPS



Built to Meet All Possible Power Plant Requirements

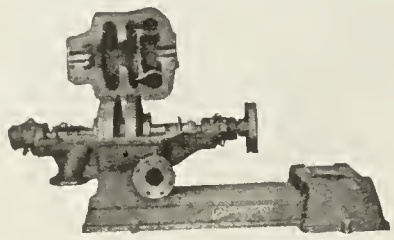
Fifty standard types of centrifugal pumps regularly built and special designs as wanted.

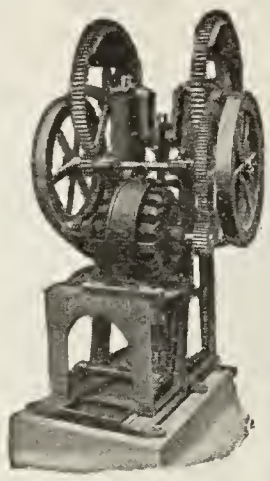
Also a complete line of deep well plunger pumps.

Write for Catalogs.

The American Well Works

General Offices and Works: Aurora, Ill.
Chicago Office: First National Bank Bldg.





SWABY

Gravel and Dredging Pumps

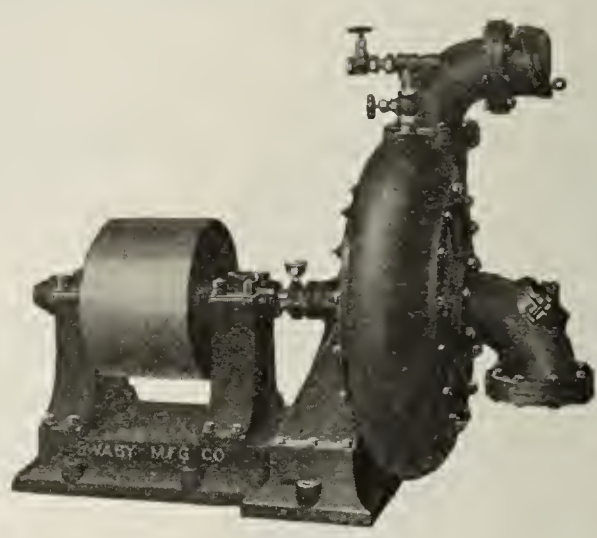


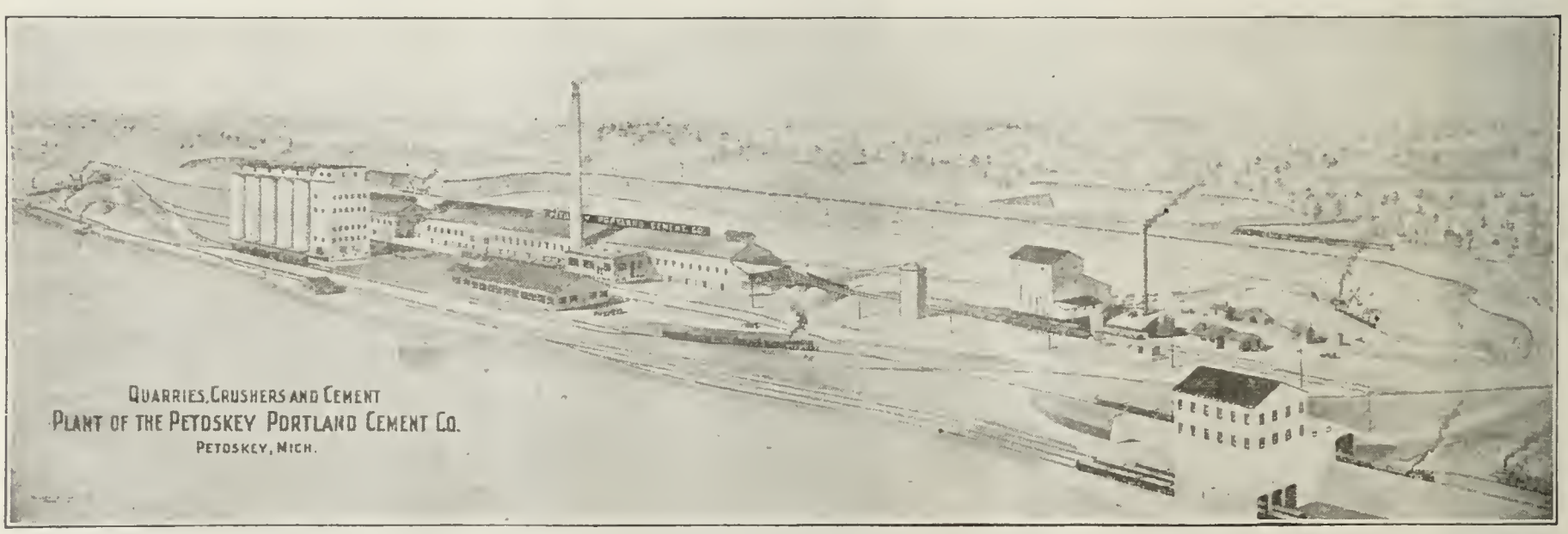
Illustration shows belted outfit but can also be supplied direct connected to Vertical Engine upon same base.

Swaby Manufacturing Co.

2010 MARSHALL BLVD.
CHICAGO, ILL.

THE KILNS IN THE NEW PLANT OF THE
PETOSKEY PORTLAND CEMENT CO.

are lined with high grade fire brick furnished by The Davis Fire Brick Company.

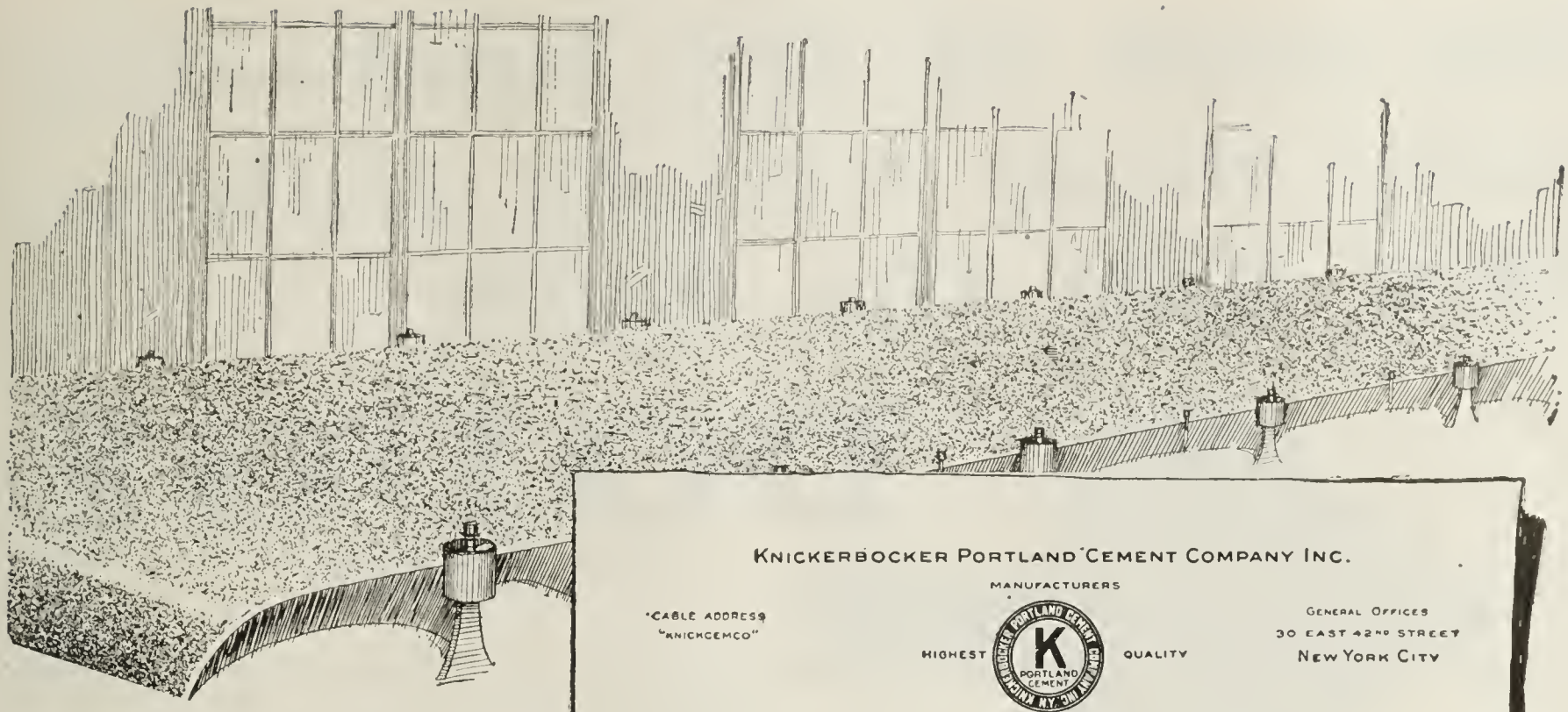


We devote a special department to the manufacture of brick particularly adapted both physically and chemically to cement kiln construction. Large stock carried. Prompt shipments made.

Write for quotations on standard and special shapes.

THE DAVIS FIRE BRICK CO.

OAK HILL, OHIO



KNICKERBOCKER PORTLAND CEMENT COMPANY INC.

MANUFACTURERS

"CABLE ADDRESS" "KNICKCEMCO"

HIGHEST QUALITY

GENERAL OFFICES
30 EAST 42ND STREET
NEW YORK CITY

HUDSON, N.Y.

July 20,1921.

R.D.Skinner & Co., Inc.
150 Nassau St.,
New York, N.Y.

Gentlemen:

On December 26,1920, we placed in service a conveyor requiring 680 feet of belting, 20 inches wide. This conveyor belt had to handle hot cement and to make a test of the various beltings, we used two pieces of standard rubber belting manufactured by the best rubber belting companies and one piece of Lion Paw belting purchased from you and made by the Buckner Process Company. To-day, I made a thorough inspection of the three different kinds of belting and found that the rubber belting is deteriorating rapidly. The rubber cover is cracked, because it is becoming vulcanized. I do not believe the rubber belting will last more than 8 months longer. The Lion Paw is in first-class condition and looks to be practically as good as when it was first put into service. I firmly believe that this Lion Paw belt will last at least twice as long as the rubber belt.

There is no question about the superiority of Lion Paw over rubber belting in handling hot cement and I personally would not purchase anything but Lion Paw for this class of work.

Very truly yours,

O.E.Massie
Superintendent.

OEW:S

KNICKERBOCKER FOR STABILITY

LION PAW BELTING

THIS letter from one of the country's large cement manufacturers speaks for itself. Lion Paw makes an excellent conveyor belt because

It never cracks or becomes stiff.

Its interwoven construction, internal lubrication and special coating prevent grit, dust and crushed stone particles from penetrating.

It resists heat, acid fumes and water.

Its tensile strength and wearing qualities are exceptional.

A trial of Lion Paw Belting will make you as enthusiastic as the writer of this letter. Lion Paw will cut belting costs in *your* plant.

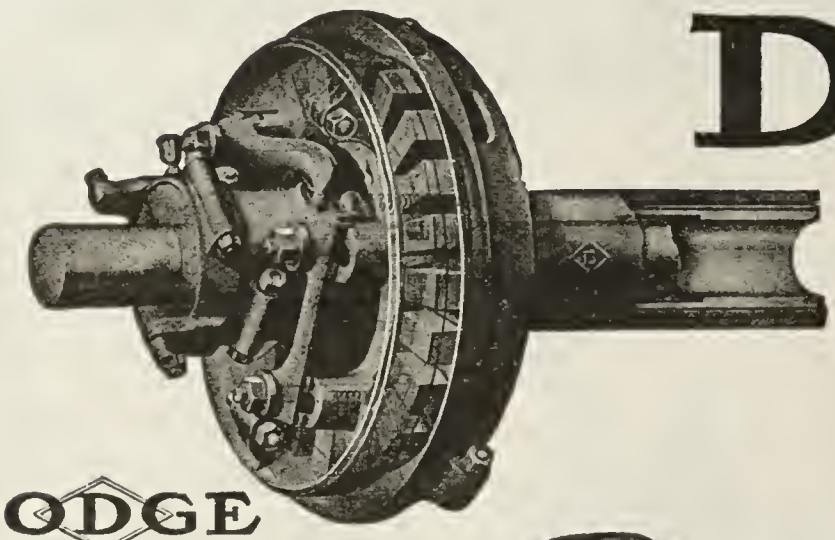
Write for samples, prices and the terms of our guarantee.

LION PAW BELTING

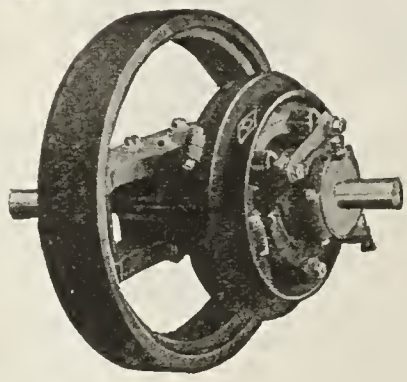
R.D. Skinner & Co. Inc. 150 Nassau St., New York City

Be sure of the best—buy only those friction clutches that bear the name

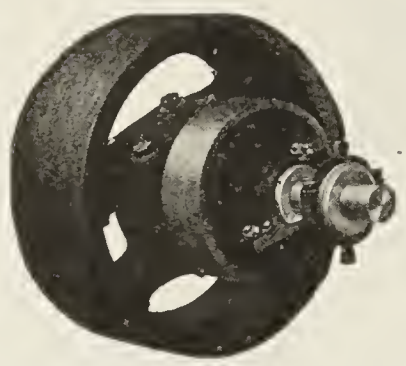
DODGE



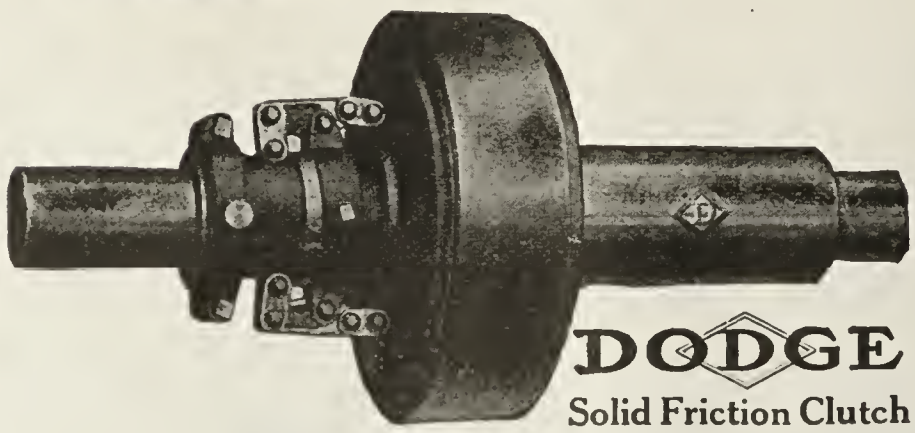
DODGE
Split Friction Clutch



Dodge Split Friction Clutch in connection with Dodge Split Wood Pulley.



Dodge Solid Friction Clutch in connection with Dodge Split Wood Pulley.



DODGE
Solid Friction Clutch

By making it possible to individualize departments and machines with the retention of a central power plant, thus minimizing shut-down losses incurred where a one-machine breakdown may keep an entire plant idle, the friction clutch has become an important factor in all modern plants.

The selection of any one type of clutch (solid or split) is largely a matter of preference, save where application to an existing shaft makes the split type obviously desirable. However, when it comes to the selection of the best in either type, preference must give way to logic.

The logical clutch purchase must always be Dodge; a Dodge friction clutch is a result of the things that make for leadership—the best of practical knowledge, materials and workmanship.

Dodge friction clutches are carried in stock by Dodge branches and dealers everywhere. Never buy a clutch without first seeing a Dodge dealer.

Dodge Sales and Engineering Company

Distributor of the Products of the Dodge Mfg. Co. and the Dodge Steel Pulley Corp.
General Offices: **Mishawaka, Ind.** ***Works:*** **Mishawaka, Ind., and Oneida, N. Y.**
Canadian Plant: **Dodge Manufacturing Co. of Canada, Ltd., Toronto and Montreal**

Philadelphia Cincinnati New York Chicago St. Louis Boston Atlanta Pittsburgh
Minneapolis Houston Providence Seattle Newark

Light Wall Forms

A Detailed Account of the Advantages of the Light Wall Forms of Steel. Interesting Facts For Your Consideration.

Steel forms are the modern facilities for the building of concrete structures which enable the workman to accomplish more with less effort and the contractor to profit accordingly, not only through the saving in labor, but by his saving in material and the completion of a much better job.

Light wall forms, made of sheet steel, cannot warp, shrink, crack, leak, nor wear out in use as they are practically indestructible. They can absorb no oil, no concrete is lost, uniform wall thicknesses are maintained and the finished job presents a smooth surface impossible to attain in any other manner except by refinishing.

The uses for steel forms are limited only by the uses for concrete, although the heavy wall forms or special forms for special and particular work are arranged somewhat differently than the light wall forms dealt with in this article, the principles of concreting being the same, however.

Light wall forms are peculiarly suited to the construction of retaining walls, foundations, and superstructures, but have found wide application in forming grain elevators, coaling stations, sewage purification works, baffle walls in reservoirs, side walls of tunnels and sewers, and the walls of circular tanks.

The form is built entirely of steel, consisting principally of a number of steel plate panels, each approximately 2 eet square, reinforced with steel angles on all four sides and across the middle, and weighing about 22 lbs. each. The panels are connected and held to alignment by means of liners, keys and ties. Fractional panels, lap panels, and corner panels are used for adjusting forms to the proper length between corners to provide the varying wall thickness.

The liners, which are made of steel angles, serve a triple purpose; First, holding the panels absolutely rigid; second, they make it possible to move the forms in large units; and, third, provide means for quickly and accurately lining up the forms.

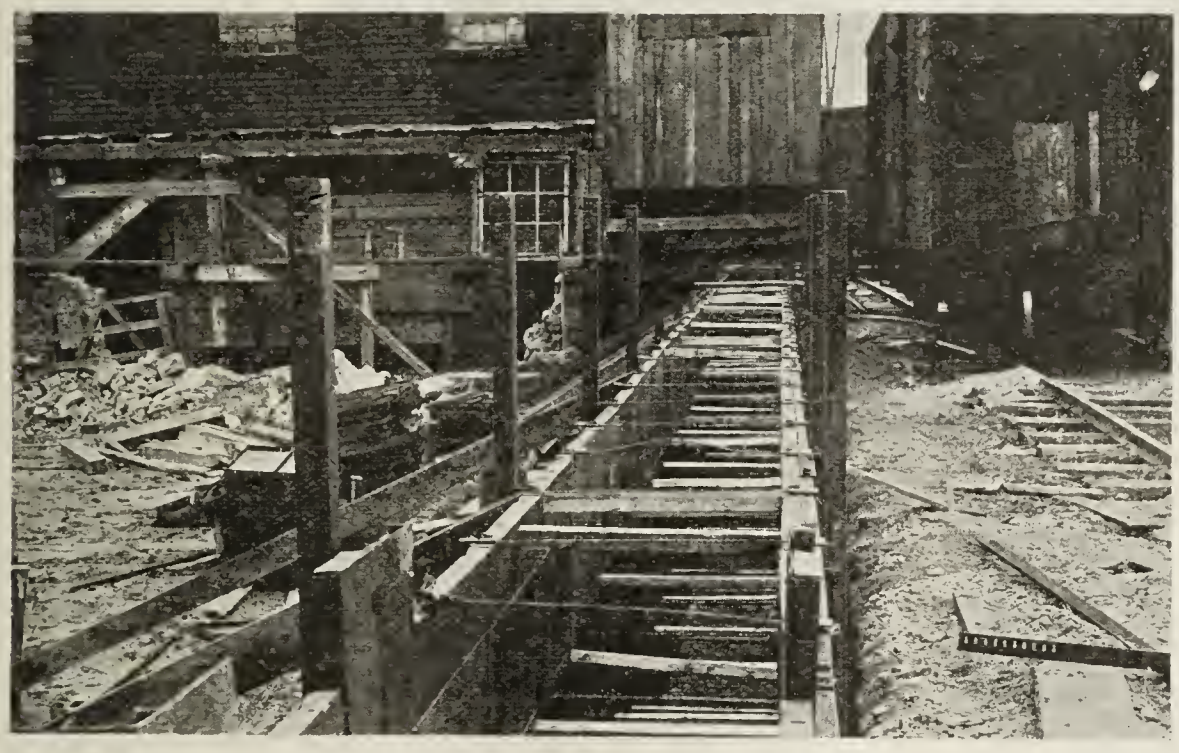
Wedge-shaped keys are used for joining panels together, and also for attaching liners for securing spacers or ties.

These keys are all exactly alike, and are easily secured in place or removed by a blow of the hammer. Wire ties are usually used and are made up on a frame constructed for that particular use, before the forms are set up. These ties can be made cheaply and exactly of the same length and strength, insuring perfect uniformity of wall thickness and doing away with the large expense for wire ties necessary with wood forms.

When these forms are to be shifted by hand, they are usually assembled in courses 2 ft. high, this being the height of the panels, and in units containing not more than 24 sq. ft., of surface, or 12 ft. long. Larger units can be built up, depending on the mechanical methods of handling these forms which are adopted by individual contractors.

The experience of form manufacturers has shown that the two-course method is the cheapest which can be employed in connection with foundation work. By this method, two courses of 2-ft. panels (4 ft. high) running completely around the foundation are set up for such portions of the wall as it is desired to build at one time or for all of the foundation. Concrete is then poured for 4 ft. height of wall. The lower course of 2 ft. is then removed in sections which are convenient to handle and placed on top of the second course, becoming a third course secured by keys to the forms already in place. When the third course is poured, the forms for the second course are shifted upward and used for the fourth course. This process is repeated until the wall is carried up as high as desired.

If it is necessary to pour more than 2 ft. high of wall at each operation, three, four or five courses of forms are recommended for use at one time. The forms are usually strong enough to fill 10 ft. of wall at one pouring. One course is always left in place to support the courses which are shifted upward.



Form ready to receive concrete. Wire ties are made of equal length before insertion in the form. Eliminates twisting of wire after insertion

Close-up detail of wall form.

When the two-course method is pursued, No. 14 iron wire is used to make the ties. If more than two courses are employed, No. 12 wire is used for ties. Wire ties are inserted in recesses provided for them in the panels. The wires are held by keys which pass through the slots in the flanges of adjacent panels. The customary method pursued in setting up forms is very simple. The required number of standard panels is placed together and connected by the interlocking keys. These, in turn, are stiffened by attaching a horizontal liner. The enlarged sections so constructed are set up and wire ties inserted. These wire ties are

On the job with light, steel wall forms. Shows labor saving methods in concrete wall construction.

used to keep these forms from spreading and are made in a tiemaking machine, described in a foregoing paragraph. The usual wood spreaders are used. After two or more courses are set up with the ties in place, the vertical liners are attached to keep the wall surface plumb.

For foundations and walls of houses, it is sometimes convenient to use a two-course outfit entirely around the walls. As an aid to determining the size of equipment for constructing a building by this method, the following rule may be applied: Multiply the total distance in feet around the outside of the foundation wall by 8. The result will be the total number of square feet of forms to be provided. The number of corners to be taken care of should be specified, to aid the manufacturer in supplying the correct outfit.

Important to Builders

A book written by H. S. Rogers, B.Sc., C.E., and issued by the engineering department of the Truscon Steel Co., Detroit, Mich., is devoted to a consideration of shearing stresses in beams in reinforced concrete building designs. It gives a complete analytical comparison of loose stirrup designs and beams reinforced with rigidly-connected shear members. Some of the matters discussed are requirements of beam design, cost of steel and handling, stress lines, designing of shear members and anchorage of them. Two appendices consider the anchorage of web reinforcement and bond stress. The author, who has devoted considerable time to the study and practical design of reinforced concrete structures, is now connected with a university as professor of hydraulics and structural mechanics. A copy of this interesting book will be sent to anyone on request.

Steel Chain Data Book No. 475

The Link-Belt Company of Chicago, Indianapolis, and Philadelphia have just issued a new Steel Chain Data Book No. 475.

In this book is presented completely the heavier rugged steel chains used for Power Transmission, and also including Elevating and Conveying Chains.

Copies can be secured by any of our readers interested in this subject by addressing the Link-Belt Company.

We quote from the foreword of this book:

Malleable iron sprocket chains manufactured by the Link-Belt Company, have rendered splendid service in their field for more than forty years; but the demand for chains that will run at higher speeds and under greater loads, has been so insistent that we have developed a line of steel chains which is completely presented in this booklet for the first time.

The line ranges from the rugged slow-speed classes to the machine finished high speed chains, but in every case the chains are accurate as to pitch, ample as to joint bearing surface, with a joint construction permitting free lubrication, and material specially selected and treated to provide strength and toughness in the side bars, and to resist wear in the joints.

Brute strength in a chain is the cheapest quality, but service and durability can only be secured if the essential requirements above enumerated are met.

Sprocket wheels play as important a part in the satisfactory operation of a drive as the chain itself.

If you are looking for satisfactory operation of a chain drive, and a low maintenance cost, don't expect to get it by buying a chain from one maker and sprocket wheels from another.

You can do that with leather or rubber belts and pulleys, but not with chain and sprockets.

The sprocket must fit the chain, and must be ground or machine finished to secure this fit. Money paid for a well fitting sprocket wheel yields large returns.

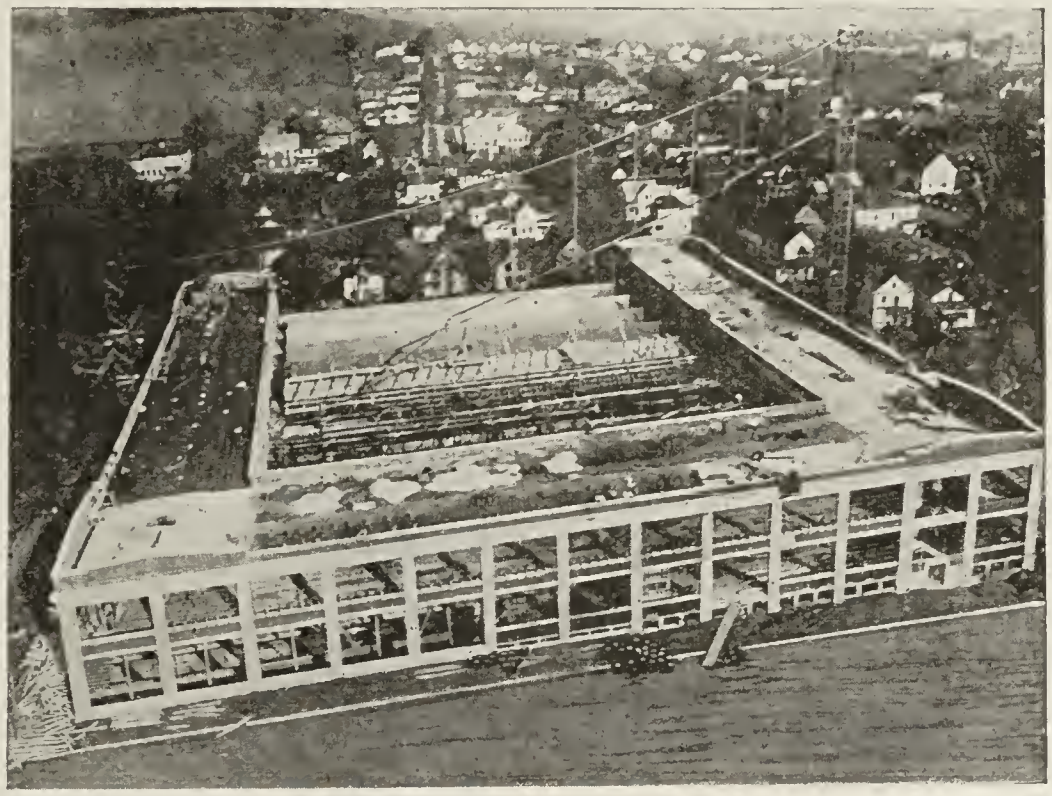
Link-Belt Sprockets are made to fit Link-Belt Chains.

Concrete in a Modern Tannery

By WALTER KIDDE, President
Walter Kidde & Company, Inc., New York City.

The tannery of the Surpass Leather Company, which has just been put in operation at Gloversville, New York, is an example of the modern procedure in industrial plant design. Instead of selecting a building layout which could be erected for a minimum cost per square foot of floor area, attention was concentrated on producing an arrangement of tanning processes and equipment which would give the lowest manufacturing cost per dozen skins turned out; the building was then designed around this equipment. The results achieved by this procedure have been eminently satisfactory, the use of fire-proof and enduring cement structures is amply justified, for the economies soon to be realized when the plant is in full production will give savings as compared to previous manufacturing costs which readily account for the abandonment of the old rather characteristic group of wooden tannery buildings. The use of concrete as the basic structural material was early decided on, because of its advantages as to adaptability, permanence, architectural value, and sanitary qualities. An unusually wide variety of types of concrete construction enter into the building, each type having been selected as best for the particular conditions to be met. For example, both flat slab and beam and girder designs are used in floor construction; flat slab, hollow tile and beam and girder in the roofs; horizontal and vertical reinforcement in the cellar walls; and reinforced retaining walls where the first floor was in places omitted. A study of the layout will show that every foot of space has daylight—no cellar operations are tolerated.

The tannery was designed for a daily output of a minimum of 600 dozens skins in fancy glazed kid for the best shoe trade, in which quality is paramount. The plant as built represents the Ford idea in production—once the raw skin enters, it follows in process until the finished product emerges on schedule time in economic production.



General Description.

Briefly, the building is of reinforced concrete, two stories in height, two bays (40 ft.) wide, extending in U-shape along 3 sides of the city block approximately 250 feet square; the interior court is enclosed with a concrete roof carried on structural steel, with full flood of north light coming through the saw-tooth construction; this constitutes the "beam-shop," where the wet processes are carried on. A basement is provided along one side of the 2-story portion only, and serves to house the soak vats, chlorination system, piping mains and electrical feeders. The total floor area is 110,000 square feet.

The floor surface in general is cement-finish monolithic with the concrete slab or base; where subjected to wet processes, the finish contains Impervite waterproofing, and where the floors will be dry, Minwax was applied, to prevent dusting. In the beam-shop, muriatic acid and other substances produce conditions which would subject the cement floors to heavy wear. The floor surface here consists of vitrified paving brick laid flat on a sand cushion over a concrete base, the joints being poured with hot, clear asphalt to the full depth. Likewise, in the glazing department, even a trace of dust is objectionable; this requirement called for a maple floor laid on creosoted sleepers.

Exterior walls are of red tapestry brick laid in red cement mortar with raked joints, giving a rich architectural effect by contrast with the rubbed finish of the exterior concrete surfaces. The inside face of tapestry brick wall is cement plastered, due to variable thickness of the brick.

Interior partitions are of common brick, except that where subject to splash from wet processes, liable to cause erosion in brick, the lower 5 feet are of concrete. In the beam shop, concrete splash walls 5 feet high are provided to segregate the various batteries of reels and twisters.

In order to obtain an unobstructed width of 40 feet throughout the entire second floor for the most advantageus arrangement of the drying, staking and seasoning departments, the interior columns were eliminated by spanning from wall to wall with heavy concrete girders to support the roof. The deck is of ribbed construction, with hollow tile between ribs and 2 inches of concrete above the tile; openings are provided in each bay for roof ventilators. The roofing is Barrett specification throughout.

The interior court, as previously mentioned, is closed in with a "sawtooth" type roof, supported on steel columns, trusses and purlins; the deck consists of a 3½-in. concrete slab, in which were embedded nailing strips for holding the roofing in place at the steep angles encountered in this type of construction. Corrosion, which had particularly to be guarded against because of the high humidity and acid fumes prevailing in a beam shop, was taken care of by painting all structural steel members and concrete surfaces with a special acid-resisting paint; in addition, the cross-sectional area of the reinforcing rods was increased 30% to offset any internal corrosion in the slab. To protect the structural steel columns against lime, acid, etc., they are encased in concrete to a point 5 ft. above the floor line.

Floor Drainage

Cleanliness in a tannery is of extreme importance if good working conditions are to be maintained. Cleaning up after the day run was therefore regarded as one of the essential processes, instead of as a secondary matter, and facilities were provided for effectively cleaning every department with a minimum of effort. In the beam shop, the floor is everywhere sloped to drain into a system of 20-in. wide concrete trenches having slotted sectional wood covers. These trenches have V-bottoms with rounded corners, and grade at 1% to a central manhole, from which a 20-in. vitrified private sewer conducts the effluent to outdoor sludge tanks for settling out the solid matter. On the second floor, floor drains are set in the slab and connected by galvanized pipe to the private sewer. Hot and cold water hose connections are provided at convenient points for flushing out machines, floors and trenches.

Stoppage of tannery sewers is common and to some extent unavoidable. The manholes of concrete were therefore spaced close together, made amply large, and were continued down 2½ feet below the bottom of the pipe, to act as a sediment pocket and to give more convenient access to the sewer pipe when it becomes necessary to remove obstructions.

One of the most important features of the plant is the new method evolved for liming the skins; the process for handling the skins is perhaps the latest word for efficiency and economy.

Disposal of the lime waste is accomplished by flushing the material into a system of floor trenches, which carry it over a screening mechanism to remove the larger solid particles. The liquid then passes into a concrete sump in the basement, from which it is discharged by means of submerged centrifugal pumps into a pipe line which conveys it to a convenient point in the factory yard. Here the liquid is allowed to flow at low velocity through a series of concrete tanks and finally through a coke-bed filter to the sewer; the solid matter is periodically raked out into wagons, the tanks being elevated on concrete piers to a suitable height to permit direct discharge into the wagon bodies.

Chlorination System

Unless proper precautionary enclosures are employed, the spread of anthrax from a tannery is a real danger to the community. This danger exists only in the effluent from the soak and milling departments, since the process of liming also sterilizes the skins and renders the wastes from subsequent departments harmless so far as anthrax is concerned. The method of treating the effluent is a specialty of the engineers in charge of this work, who developed a system acceptable to the Bureau of Animal Industry, in which the effluent from the raw skins has injected into it chlorine gas, the process resembling that used in water works systems to protect against typhoid. It may be briefly described as follows:

The soak vats and milling drums are placed in a separate department having a water-tight cement floor from which the wastes are collected in drains, which, together with the soak-vat discharge, are piped into a concrete tank in the basement. This tank, approximately 67 ft. long, 18 ft. wide and 6 ft. deep, has a working capacity of 31,400 gallons, it is entirely independent of the building and is slightly depressed into the floor. The interior is completely lined with a special acid-resisting asphalt membrane, and is divided longitudinally by means of wooden baffles into four connected flumes, forming a continuous passage. A 36-in. diameter bronze ship propeller is mounted in one of the flumes, with shaft extended through a stuffing box to a motor drive outside the tank. The outlet is provided with 10-in. dual valves, piped to the private sewer leading to the outdoor sludge tanks. At one end is a small room entirely enclosed, in which are located the panels and scales for injecting chlorine, and the cylinders of chlorine gas.

In operation, the effluent is collected in the tank during the day; at the end of the run, a float gauge in the chlorine room indicates the total effluent in the tank as well as the pounds of chlorine required for sterilization. The panels are then set to feed this quantity of chlorine in one hour, and the propeller is started up; the rapid circulation through the flumes produces effective mixture and places the solids in suspension. When the treatment is complete, the discharge valve is opened, allowing the contents to flow to the sludge tanks; here the solids settle out while the clear liquid flows into the city sewer.

Miscellaneous Concrete Structures

The equipment for carrying on the wet tannery processes is almost universally of wood; in small apparatus this was adhered to principally as a matter of economy. In the larger units, however, the customary wooden supports were supplanted by concrete piers, notably for the soak vats, twisters and coloring drum. Soak-vats built of concrete were also considered but because of the susceptibility of the wet skins to abrasion against the concrete, the scheme was abandoned.

As ordinarily erected, the glazing machines almost invariably cause vibrations in the building, due to the unbalanced reciprocating mass of the glazier arms. This was obviated by providing a continuous concrete mat 20 in. thick and heavily reinforced, extending under the entire battery of machines; anchor bolts were cast in place to hold the cushion timbers on which the glazing machines are mounted, and for the diagonal bracing to prevent lateral swaying of the tops of the machines. The mat is carried on piers to solid ground, and is everywhere independent of the building foundations and walls.

The opening of the tannery was the occasion of many felicitations by the press and people of the town of Gloversville. The tannery is owned by the Surpass Leather Company, the outgrowth of business conducted by Booth & Company in Gloversville over a period of fifty or more years, it being one of the pioneer industries of the town. The wisdom and far-sighted policy of the Company is responsible for the employment of technological treatment in this, the very latest word in tanneries. Mr. Charles H. Skinner, the General Manager, and well-known authority on glazed kid, was in charge of operation for the Company.

The Production of Sand and Gravel for Use in Concrete

The present high prices of materials and labor, and transportation facilities combined with an urgent need of roads, make necessary a scrutiny of past practice in the use of materials with a view to conservation.

Engineers are moving away from the idea that concretes should be proportioned arbitrarily, as for instance 1:2:4; 1:3:6; and 1:4:8. These proportions were based on the view that the voids in the coarse aggregates were about 50 per cent and would take about half as much fine aggregate to fill these voids. The cement was proportioned to make a rich mortar as 1:2, or a leaner mortar, as 1:3.

The recent more complete studies of aggregates have shown us that the proportions should be fixed by the graduation of the sizes of the sand and coarse aggregate. Sands and also coarse aggregates vary among themselves, and the mix may be adjusted to suit the aggregate.

In other words, on any given job it is desired to produce a concrete of constant strength and constant consistency. The problem is then to vary the amount of cement and water to suit the aggregate on hand, so as to produce a concrete of like strength to the base concrete, and one which would have the same workability or consistency.

For instance, the engineer fixes as his ideal a concrete mixed in proportions of 1:4½ where the sand is 42 per cent of the coarse aggregate. How can he use an aggregate in which the sand is 60 per cent of the total aggregate?

These problems are of vital interest to the producers of sand and gravel, and also to the tax payers of the state and all those investing their money in concrete structures. As a matter of general conservation, we should desire to use, as far as possible, the entire contents of these natural deposits of sand and gravel. In some cases there is an excess, and in other places a deficiency in the amount of sand. It has been stated that one plant of Indianapolis has some 300,000 yards of good washed sand, which can not be used under an arbitrary specification of 1:2:3. By intelligent proportioning the amount of cement may be increased so that equally good concrete can be produced, using this sand, at a less total expense when all elements of cost are considered.

Apart from these problems, which arise because of the different sizings of the aggregate, there are much simpler problems of testing the quality of the aggregates in respect to cleanness and hardness.

Broken stone is a manufactured product; and standardized tests and specifications exist for this material. Gravel deposits are natural deposits and the tests and specifications for the control of these have not yet been standardized.

A similar comparison might be made as between tests of steel and those of timber. Steel is manufactured and the technical control is fairly definite. Trees must be taken as nature produces them. Specifications for grading and defects of timber must be more or less imperfect and the inspection to a large degree a matter of skilled measurement.

When we come to examine the present status of tests and specifications for sand and gravel and for proportioning concrete we are confronted with a disagreement of experts, a disagreement which is not only in practical operation, but in fundamental theory. It is not possible therefore to make a definite pronouncement upon these matters at the present time. For a time present specifications will be followed, but there should be a certain tolerance or allowance, in so far as the proper control of the contractor and uniform practice as fixed at Washington will permit.

We have to recognize another fundamental difficulty in that the essential properties of these aggregates are masked or camouflaged in the process of making them into concrete, and then determining their value by tests of concrete. In this process variations of mixing and laboratory practice arise.

It is to be hoped that, in the end, specifications may be written for the cleanness, hardness, and limitations of size of aggregate, and that these specifications will allow a considerable variation of the grading of the sand and aggregate, and a variation of the amount of fine and coarse aggregates. Another set of specifications will apply to the use of these on the job, varying the proportions of the concrete, the amount of water and cement as the aggregate varies, and governing the workmanship of the contractor—all to produce a concrete of given quality.

These ends are in the future and can only be reached by a carefully planned program of research, in which the National Sand and Gravel Producers' Association should have an important part.

The present paper will endeavor to review the status of the present opinion in respect to these matters, and to touch upon certain tests made at Purdue University for the Indiana Sand and Gravel Producers' Association.

Review of the Specifications for Sand and Gravel Aggregates

The cleanness of the sand is now well determined by the so-called colorimetric test designed by Prof. Abrams.

The hardness of sand and gravel aggregates is yet to be measured accurately. In the case of broken stone the well-known Deval test subjects the samples to the action of a rotating cylinder, which is inclined on its axis. The pieces of the stone are tossed back and forth and worn by the grinding and impact. The soft material worn from the stone is left in the cylinder and thereby a soft stone protects itself from the action of the test. Recent investigations at Purdue University suggest that a much better test can be found when the cylinder is horizontal and the staves are set apart so that the fine material can escape. It is hoped that a hardness factor for gravel can be established by the use of such a test similar to that specified for broken stone.

In the matter of sizing of aggregates, that is, the gradation of sand and gravels and the proportion of sand, we enter into a field of controversy.

To take some examples:

In the vicinity of Lafayette, our gravel banks contain an excess of sand. An arbitrary specification of 1:2:4 fixed for a concrete building forced the contractor to haul in coarse material to meet a requirement of 1:2:4, that is, twice as much gravel as sand. Actually is was proved in this case that the material in proportions as supplied would make as good a concrete as the 1:2:4. If, for instance, the division between sand and pebbles had been fixed on the 1-8 inch screen instead of the 1-4 inch screen, the specification of 1:2:4 could have been met by the material.

Now, it is an arbitrary matter as to the specification of a screen which will divide sand from pebbles. What we have to consider is the entire aggregate.

In such cases a study of the qualities of the entire aggregate which will produce a concrete of standard quality by the variation in the amount of cement or by some other means, would be a saving to the owner and to the state at large.

The controversy was well defined at the June meeting in 1919 of the A. S. T. M., where such experts as Messrs. Young, Edwards, Abrams, Crum, Thompson and Talbot presented their views. These may be briefly reviewed.

Factors Entering into the Problem

In the proportioning of concrete we have to consider the following different factors, all of which influence the final strength and are dependent upon each other:

1. The aggregate, which will vary in size of particles and distribution of these particles, so that there will be a difference of surface area to be covered, or a difference of fineness modulus requiring more or less cement, or more or less water.

2. The cement, which must be supplied in an amount necessary to bring about a standard strength —this amount is governed by the change in the aggregate and the amount of water needed to bring the concrete to a given consistency.

3. The consistency, which is determined by the conditions of the job—one kind of a job requiring concrete which will easily flow around bars and into spaces. Another job where the concrete is fairly dry and can be tamped.

4. The water ratio, or the relation of the amount of water to the amount of cement. This is fixed by the consistency, the aggregate and strength. This water ratio is the ratio of the volume of water to the volume of cement. A water ratio of 1, or unity, means that there is a cubic foot of water to a cubic foot of packed cement. Wet mixes have a high water ratio and dry mixes a low water ratio. This water cement ratio is an index of the quality of the cement paste used to glue together the particles of the aggregate. If there is too much water, the paste is weak and the concrete is weak.

5. The strength of the concrete necessary to withstand the service to which the concrete is to be put.

The character of the gradation of the aggregate is proposed to be measured by either (2) the surface area or (b) the fineness modulus. The surface area is advocated by Messrs. Young and Edwards, the fineness modulus is advocated by Prof. Abrams.

The surface area is the sum of the areas of all the particles of the aggregate. The thought is that the greater the surface, the more water required to wet the aggregate, and there fore the greater amount of cement must be used so that the cement paste will not be too weak.

The fineness modulus is obtained by adding together the sum of the percentages retained on a given set of Tyler standard sieves, and dividing by 100. The sieves are Nos. 100, 48, 28, 14, 8, 4, 3-8, 3-4, 1 1-2. We do not know yet whether the concrete making properties of the aggregate are best fixed by the fineness modulus method or by the surface area. A few statements may serve to clear up the ideas on those matters.

We will start with the standard consistency, because that is the one condition that must be preserved constant, and also with a standard strength, because that is also the aim in the particular construction. The problem then is to know what to do when the aggregate varies.

The other three factors, i. e., cement, aggregate and fater ratio, can then be varied. In the first place we might mix together the different sizes of the aggregate in different proportions to reduce the surface area or increase the fineness modulus, so that with the same amount of cement and water the standard consistency and strength might be obtained.

Or second, we might take the aggregate as it comes to the job, test it, use it as it is, and then change the amount of cement and the amount of water to bring about the standard consistency and the standard strength. The latter is the more practical method and the method used by the Hydro-Electric Power Commission of Ontario, Canada, as reported by Mr. Robert B. Young, in the Engineering News-Record of January 1, 1920. This method of control is being used on about one-half million cubic yards of concrete. It is stated that by proper study and control the strength of standard 1:2:4 concrete by the usual methods have been reached by a concrete proportioned 1:2 1-2:5.

The determination of consistency is more accurate than by inspection, if certain modern methods are used. Prof. Abrams' normal consistency is determined by the so-called sag test. A 6x12 inch cylinder of green concrete is formed and the surrounding form is withdrawn by a steady upward pull. When the form is released, the cylinder sags down. A concrete of normal consistency will show a slump or sag of ½ to 1 inch. A relative consistency of 1.10 will require the use of about 10 per cent more water and will give a slump of from 5 to 6 inches. This slump test is used for controlling the consistency of concrete on the job.

Another form of slump test uses a cone instead of a cylinder. The cone is 2 inches less in diameter at the top than at the bottom.

The third method jolts a measured mass of concrete a given number of times so as to cause the mass to flow or spread concentrically outward. The increase in diameter of the concrete is a measure of the flow or consistency. For instance, a road consistency has a flow of 1.8 times the original diameter. For reinforced concrete work the flow is twice the original diameter.

All agree as to the importance of the amount of water to be used in gauging the concrete. Prof. Abrams was the first to call attention to this important element. He has shown that the strength of the concrete or mortar mixture depends upon the ratio of the volume of water to the volume of cement.

The water must do three things: (1) it must supply sufficient water to reduce the cement to a paste; (2) and an additional quantity to wet the surfaces of the particles of the aggregate; and (3) additional water to give the proper consistency or mobility to the concrete. We cannot reduce the water arbitrarily because in a reinforced concrete job, where the concrete must flow around steel bars to confined places, the strength must be sacrificed to obtain mobility.

If there is too much water, the cement paste is weakened and thinned out. Abrams says that the amount of water required to wet the surface of the aggregate is a minor amount. For instance, he tells us that the amount of water necessary to produce free water on the surface of standard Ottawa sand is about 1-20 of a pint per cubic foot of sand, and much less for most material, less than 1-80 of the water used. Since the water required to wet the surface is the only fatcor which has any bearing on the surface area of the particles, it seems to him that the quantity of water required to wet the cement and the quantity of water required to produce a plastic mixture are the important factors and that these are only remotely

related to the surface area of the aggregates.

Professor Abrams tells us, however, that the character of the aggregates, as far as the designing of the mix is concerned, is best expressed by what he calls a "fineness modulus." To obtain this fineness modulus he adds together the percents of the aggregate retained on specific series of sieves and divides this by 100. Messrs. Young and Edwards, on the contrary, believe that the surface areas of the aggregate are the controlling factors and that concrete mixtures should be designed only after the surface areas have been determined.

Some facts relating to surface areas of aggregates are interesting.

The finer the sand the more surface area of the particles per unit weight. That is:

Coarse Aggregate	Gravel sq. ft. surface per 100 lbs.	Broken Stone sq. ft. surface area per 100 lbs.
Between—		
2½ and 1½ sieve.....	23.6	36
1½ and ¾ sieve.....	42.7	62
¾ and ½ sieve.....	74.6	124
½ and ¼ sieve.....	130.00	163
For Sand—		
¼ and No. 6 sieve.....		255
20 and No. 35 sieve.....		1744
65 and No. 150 sieve.....		6975

Those values are obtained by counting the number of particles between the sieves, weighing them, and thus determining the number of particles per unit weight. Then the specific gravity of the material is found. Then it is assumed that the particles are spheres. Thus suppose between No. 20 and No. 30 sieves there are 1,500 particles per gram. Specific gravity = 2.70. Weight of a solid subic foot of sand material = 2.70 × 62.4 = 167.7 lbs. per cubic foot. or 43 grams per cubic inch. Therefore, 43 × 1,500 = 64,500, number of particles having total volume of 1 cubic inch. Average volume of particle = 1-64,500 cubic inch. From the volume, the radius and surface area are calculated. Thus in example, diameter = 0.03093 inch, and surface area = 0.0030055 square inch, or surface area per gram = 4.5085 square inch, or 1,422 square feet for 100 pounds.

In case of a gravel, screened between 1-inch and ¾-inch screen, the average volume of a particle was 0.2694 cubic inch, the average diameter 0.8013 inch, the surface area per particle 2.0336 square inches, and the surface area 54 square feet per 100 pounds.

The surface area increases rapidly as the size of the particle decreases (almost in the law of hyperbola). The gravel has less surface area per unit weight than broken stone and would require less cement for equal strength.

Mr. Young takes up this problem. Suppose the consistency and the compressive strength are to remain constant, as they should be on any particular job, how then shall we vary the cement? In the first place there must be a constant ratio of the volume of water to the volume of cement. Otherwise the strength will decrease. Now, when the grading is changed there is a change in the surface area, and therefore a change in the amount of water required to wet the aggregate. His method then is to vary the cement and the water to make the proper balance between the additional cement content and the additional surface area, so as to produce a concrete of equal strength.

To investigate the concrete making properties of a proposed aggregate by the surface area method, the procedure adopted by the Hydro-Electric Power Commission of Ontario and to be used on one-half million yards of concrete is thus outlined by Mr. Robert B. Young, assistant laboratory engineer, Engineering News-Record, January 1, 1920.

(1) From 3,000 to 5,000 pounds is shipped to the laboratory.

(2) A mechanical analysis is made and surface area calculated.

(3) The most economical mixture is then found; that is, one containing the lowest surface area per cubic foot of material, provided that this mixture can be successfully handled and placed.

(4) These mixtures are made in the laboratory to observe their mobility, but final decision on mobility is made in the field.

(5) Having settled upon the best grading in the laboratory, we must next find how much cement is needed for concrete of the class desired. For this purpose a series of laboratory tests of concrete is made of specimens in which cement is used in different amounts proportional to the surface area of the aggregate. The water used is that necessary to give the mixtures the same mobility.

Thus several series were tested as follows:

Cement—						
Lbs. per 100 sq. ft. aggregate	1.5	2.0	2.5	3.0	4.0	5.0
Water-cement ratio	1.118	0.915	0.780	0.697	0.590	0.526
Compressive strength.	1337	1791	2290	2851	3426	4158

Here we see that the water in relation to the cement is less as the amount of cement is increased. This is because the amount of water to wet the aggregate remains constant while the water required to gauge the cement increases at a lower rate than the cement.

(6) The Commission adopts four classes of concrete, A, B, C and D, and then specifies the cement to be used per 100 square feet of surface area, and the water content as follows:

Class	Min. Strength Compressive	Cement lbs. per 100 sq. ft. surface area	Range of water ratio Min.	Max.
A	2500	3.18	0.68	0.74
B.....	2000	2.58	0.78	0.86
C	1500	2.08	0.91	1.04
D	1000	1.48	1.14	1.37

This table applies only to one consistency. For a dryer and more mobile concrete the values are different.

Summarizing, then, the method of the Commission:

(1) The aggregate is studied in the laboratory and the surface area determined and the grading to yield the least surface area.

(2) For any given consistency and strength the cement required is then known and specified as well as the amount of water to be used. These are tabulated.

For instance, it takes 2.5 pounds of cement for each 100 square feet of surface area for a 2,000-pound concrete and a water ratio of 0.78.

(3) In the field the inspector sieves the aggregates, weighs them and figures the surface areas. He then figures the new proportions from the laboratory tables. These may be varied to produce the best results under field conditions. The following is the procedure in the field:

(a) Sieve, weigh and determine surface area by carts.

(b) Calculate bags of cement per cubic yard.

(c) Calculate quantity of gauging water for the class of concrete, allowing for moisture in sand (usually from 2 to 4 per cent).

(d) If the consistency is too dry, add cement and water in the same proportion, or if too wet, subtract these.

Of course there is an economic factor here. A dry mix requires less cement, but more labor in placing and the contractor may prefer to use more cement with more water.

Uusually it will not be practicable to change the proportioning in the field, as it will disorganize the working force. The cement and water will be varied.

The heavier the sand, the less the surface area and the less the voids.

Mr. Edwards, who originated the idea of surface area, calls attention to the important matter of the difference in condition of the sand used in laboratories and the sand used on the job. The laroratory man uses a thoroughly dry sand so as to have a constant material. The sand on the job contains moisture. Now we know that sand of 5 or 6 per cent of moisture has its volume increased as much as 30 per cent. Therefore, the results in the field, to be consistent with those secured in the laboratory, must take account of this condition. He shows that 1 per cent of water is amply sufficient to thoroughly coat the sand particles, and the bulking effect of this amount may be from 11 to 23 per cent. It is stated from 5 to 7 per cent produced the maximum increase in volume, and 18 to 20 per cent of water floods the sand and brings it back to its former volume.

The surface area method tries to secure a grading of aggregate which would yield the lowest surface area, but this should yield a concrete which could be successfully handled and placed; for instance, a harsh material with very coarse sand would have a low surface area, but might separate and would be difficult to finish. The area of the sand in an ordinary concrete mix is usually 90 per cent of the total area of both coarse and fine. Therefore, the grading of the sand is the important element in reducing surface areas.

The use of high area aggregates requires high quantities of cements. It might be that a low area aggregate would require more cement to produce a workable fat mixture than another aggregate, which had a high surface area. In this case the theory would be misleading. That is to say, an aggregate with a large surface area might require less cement for equal flowability than a low area or harsh mixture.

Again it is possible that the water ratio may be misleading, for instance, a fine aggregate might take some of the water for its surface wetting from the cement paste, which operation would produce the actual water ratio of the cement paste. The result would be that the cement paste and the high area mix would contain a higher proportion of water than one having a low area of sand per square foot per hundred pounds, may be 2,000, and for gravel only 86 square feet.

Again, we must recognize the fact that economy of mix of cement in concrete is only one factor. The efficiency of the working forces, including men and concrete machinery, etc., may be delayed by too frequent changes in aggregates with consequent changes in handling and method. It may be that economy would result in any job in the long run by holding to a standard mixture rather than varying handling of the material with each change of aggregate.

The simplest and most helpful solution of some practical problems is offered by W. R. Crum of the Iowa State Commission. He tells us how to vary the proportions of the mix when the per cent of the sand in the aggregate increases. He takes the gravel and makes one sieving to determine the per cent of sand and one weighing to determine the weight per cubic foot. Then he gives us diagrams to show the new proportions to produce concrete of equal quality. For instance, let us suppose that the engineer has specified a proportion of 1:4½, where the aggregate contains 42 per cent of sand and weighs 112 pounds per cubic foot. By his diagrams we learn that equally good concrete can be produced with a gravel containing 75 per cent of sand and weighing 107 pounds per cubic foot if the mixture is made 1:3.3 instead of 1:4½. He gives such diagrams for three classes of concrete as specified by the engineer, namely 1:4½, 1:5½, and 1:7. While Mr. Crum does not advocate the use of pit-run gravel, he does offer a simple means of controlling the concrete when the aggregate varies in proportion of sand to gravel. He shows also that his method of working in practice is satisfactory and much better than two other plans that have been used, namely, first to keep the amount of sand to the total sand constant, and second to keep the amount of sand to the total aggregate constant. Of course these relations are controlled by the weight per cubic foot of the aggregate, and the maximum size of the particles.

The producer can easily determine if the extra cost of cement in such concrete could be met by a decrease in the price of cement, when the producer is allowed to use the entire output of his plant.

It must be clearly understood that no responsible engineer advocates the use of the pit-run of the bank. What is desired is to use separated and washed materials, that vary in sizing by an adjustment of the proportions to fit the material.

Some Commercial Problems

Apart from these questions of fundamental theory, there are a number of commercial problems that can be solved by direct test under carefully conducted laboratory conditions. A number of these are now under investigation at Purdue University.

In the first place, let us direct attention to the evidence as to confirming the researches of Professor Abrams and others. The charts which have been exhibited here today show the following:

1. Where the concrete is mixed with sufficient water so that all the specimens are of the same consistency, we find that the strength varies as to the amount of water used.

2. We find that the strength increases as the fineness modulus.

3. It appears that in general the compression test tells the same story as the wear test. In other words, having determined the compressional strength, we are able to predict the resistance to wear. If this holds for all the aggregates of proper cleanness, then we need not go to the troublesome and expensive wear test, but can examine our concrete by the simple compression test.

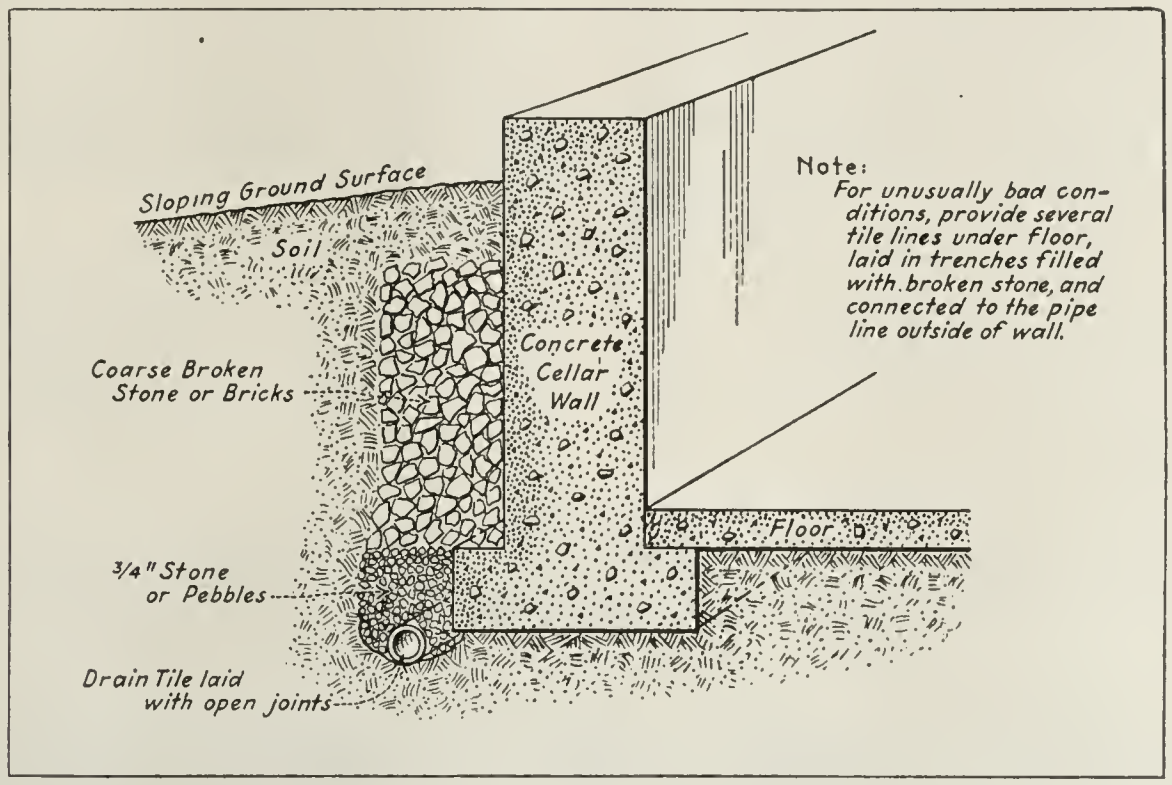
Other problems relate to the value of natural pebbles as compared to crushed pebbles, the strength of road surfaces as fixed by the diameter of the particles, and the relative amount of mortar in the concrete and also the effect of processes such as the vibrolithic resistance to wear. These matters were touched upon in the descriptions of the charts.

Dry Cellars

Two Important Points to be Observed in Securing Best Results.

No matter what the material of which a cellar wall is built, it is very desirable to use every possible method of preventing surface and ground water from collecting around and under the cellar.

The illustrations above graphically show fore-



thought and its lack in cellar-wall construction. In one instance the concrete wall is placed six or eight inches from the wall, with the ground level below that of the sidewalk. The earth of the back fill next the wall was not even well compacted and tamped, so that there is a fissure or space of almost one-half inch between earth and wall—an ideal combination of conditions for surface water to run down the wall.

The other illustration shows a wall with walks built

Wrong

Right

up against the wall and well sloped to drain the water *away* from the wall. Of course, it is not always possible to so place the walk but in every case, at least, the ground may be well tamped, sodded and sloped to drain surface-water away from the wall.

Ground Water.

Where excessive ground water is encountered, a broken-stone drain along the base of each wall, in combination with a concrete cellar wall of rich, dense concrete, will prevent future troubles.

The drawing indicates the location of the drain. The action of such a drain is almost self-evident. The ground or surface water, when it reaches the broken stone, flows down and through the open joints into the drain-tile line and is conducted away. Thus the water is prevented from coming in contact with the wall and does away with any possibility of leakage or dampness.

Concrete Coaling Stations, Sand Gates and Spouts

The Link-Belt Company, of Philadelphia, recently received contracts for supplying the machinery for two Locomotive Coaling Stations for the New York Central Railroad Company, to be located at Solvay and Wayneport, N. Y.

The plant at Solvay will consist of a 1000-ton reinforced concrete structure, equipped with 12 undercut gates and coaling chutes, and 12 sand gates and spouts, with necessary piping; two 24″x36″ gravity discharge elevator-conveyors, 177 feet horizontal and 60 feet vertical centers, having capacity of 80 tons per hour of run-of-mine coal; two 30-inch apron conveyors, and two 17′x24′ track hoppers, with grating having 15 inches square openings.

The station at Wayneport consists of a 400-ton steel pocket; six coaling gates and chutes; one 24″x36″ gravity-discharge elevator-conveyor, 78 feet horizontal and 64 feet vertical centers; one 30 inch apron conveyor; and one 17′x24′ track hopper, with grating having 15 inch square openings. This station is laid out so that it can be extended for practically double the capacity; and at that time there will be another conveying unit and track hopper installed.

At the Solvay station one unit is to be in operation in seventy days with the second unit and the entire station-completed in 90 days after date of contract. At Wayneport the station has to be in operation 70 days after date of contract.

Texas Cement Plant Run by Waste Heat

Harnessing enough waste heat from its cement kilns to operate practically its entire plant at Eagle Ford, a few miles west of Dallas, Texas, is the recent accomplishment of the Trinity Portland Cement Company. This heat had been going to waste during the entire ten or twelve years of the company's operation and the move to save it was not made until the price of gas and other fuel became almost prohibitive. It takes around 3,000 horsepower to operate the plant at full capacity. The new system has not been tested to its limit so far, but records show that the waste heat has developed as high as 2,700 horsepower.

C. E. Ulrickson, general manager of the company, is delighted with the results of the new system. It cost more than half a million dollars to make the change, not to mention converting into junk the former power plant, which cost around $300,000.

The interest on the investment necessary to save this waste heat amounts to a tidy sum but is a mere bagatelle when compared to the former outlay for natural gas, even when it could be bought for 14c a thousand feet.

Electric power for operation of the plant was formerly developed by gas engines. Some time in March, 1920, the company decided that something had to be done about the fuel question. Other cement plants had arranged to save the heat from their kilns and the operation of some of these had been inspected. The result was that on April 9, 1920, a representative of the company went East to buy a steam power plant, the steam power to be transformed into electric power. Getting a new plant at that time meant quite a lot of delay. In Philadelphia there was a power plant for sale, developing power from two turbine engines. This was acquired, including the building which housed it, and the various smaller pieces of machinery that went with it, except boilers.

Next—and most important—was the purchase of the two 1,080-horse-power boilers, arranged to utilize the waste heat from the cement kilns. These were not "in stock" and had to be made after the order was placed. Efforts to buy a pair of boilers made for another concern, but not required at the time, did not get anywhere because in those days one was lucky to get a manufacturer to accept an order, more lucky to get a definite date for delivery set and still more lucky to secure delivery on the promised date. The owners of the pair of boilers in stock wouldn't part with them, although they probably wouldn't need them for a year. The boilers were made and the Waste Heat System was designed by the Edge Moor Iron Company and installed under their direction. It includes a special damper control and flue construction that they have developed, the high type of four pass Edge Moor boiler and specially constructed and arranged superheaters, economizers and fans that they have developed for this purpose. The Edge Moor Iron Company make complete installations and guarantee results.

But to shorten a long story, the many difficulties in the way at that time were overcome one by one, and on March 18, 1921, a trifle more than eleven months after efforts to buy a new plant were begun, the power plant at Philadelphia had been bought, torn down, transported and rebuilt, the boilers built and erected, and electricity generated from steam

This Cement Company decided to utilize the waste heat and spent over $500,000

produced by waste heat was operating the cement factory at Eagle Ford. The plant is, necessarily, equipped with "direct fire" boilers to be used in stating the plant after it has been shut down. The plant has to be going before there is any waste heat to make steam.

Cement is made from limestone and shale, found in abundance on the company's property at Eagle Ford.

The raw material is scooped up by steam shovels, hauled to the plant, located, proportionately mixed crushed, dried and then "burned" in kilns before being ground and sacked for shipment. The kilns are 25 feet long and 8 feet in diameter. There are five in this plant. The crushed raw material is automatically fed in at the high end and when reduced to "klinkers" falls into a conveyor at the low end. These "clinkers" are at white heat when they fall into the conveyor, which carries them to a storage room to cool and cure before undergoing the final process of grinding to powder. It is the waste heat from these kilns which furnishes the heat to develop steam in the boilers. At the low end of each kiln or cylinder a crude oil burner develops a temperature of 2,400 to 2,700 degrees and the heat passes through the kiln, melting the raw

material into clinkers. The remainder of the heat, some 1,300 degrees, then passes through the boiler flues and develops steam to run the plant. On its way out of the boiler flues the heat goes through an "economizer" where it heats water to 100 degrees for later use in the boilers. Finally, what heat is left finds its way out of the smokestack. All the heat of the gases, represented by 2,400 to 2,700 degress temperature, produced at the low end of the kiln, is utilized in productive work except that wasted at 300 degrees or thereabouts, which finally goes out of the smokestack. Engineers are still busy endeavoring to find a way to use this last amount of heat, which gets away.

Two thousand gallons of water a minute are required to cool the machinery at this plant, the water being used over and over again, like the heat.

The plant produces roughly 3,000 barrels of cement daily, or, in round numbers 1,000,000 barrels a year.

Efficient Conveying of Dust in Cement Plants By a Clark Dust Collector

The method of handling materials in powdered form has been very successfully solved by using the so-called induction or air flotation system, which has been practically developed by the Clark Dust Collecting Co., Fisher building, Chicago. It does away with a lot of mechanical conveyors such as buckets and belts, and allows no loss of material during the process of handling, and it renders the plants more sanitary and a more attractive place in which to work by making the space surrounding the machinery practically dustless.

installing new equipment. The new installation is a complete success.

The Clark system consists principally of one or more collectors, and a fan which exhausts the air from these collectors and filters and dust through the machines in such a manner that the exhaust is practically pure air. The Clark Dust Collecting Co. has at present on the market various systems, one of them known as the all metal system, and another known as the 100% efficiency system. In the all metal system the tributaries collecting dust from the various points from the machines connect to a main air trunk which is brought into the collector known as the Clark rarefied dust trap. This trap separates the coarser material which is dropped to the bottom of the cone in the collector and is discharged through a flap trap valve. The lighter particles are carried over from the top of this rarefied dust trap through the fan and into a second machine known as the Clark-Chicago collector. This collects the remaining material which is in the form of very fine dust and also is discharged from the dust outlet, only a very small percentage of the finest dust escaping through the air vent into the atmosphere. This type of installation is practical for plants where the value of the dust is not high enough to warrant a more elaborate installation, or where the capacity of the plant is so small that it does not pay to purchase a more efficient system.

With the 100% efficiency system, practically all of the material is saved and the exhaust from the fan, is practically pure air. The main air trunk to which the various dust pipes are connected, enters the first collector known as the Clark adjustable air separator. This machine has several adjustments for regulating the quality or coarseness of the powder or dust, which is discharged from the flap trap valve at the bottom of the cone. One adjustment regulates the height of the inner cone in the collector, another adjustment regulates the admission of air to the bottom valve and in this manner practically any precentage of coarse material can be obtained.

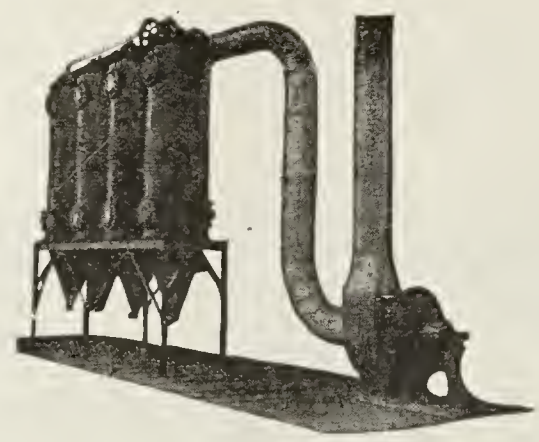
The finer dust which is carried into the top of the adjustable air separator is conveyed into the bottom of the Norblo suction filter, consisting of two or more cylinders. The currents of air traveling through the cloth filtering bags and out towards the eye of the fan. In this manner the finer dust is filtered through the bags and is dropped to the bottom of the filtering machine and taken away by the screw conveyor.

The cleaning of the bags is done by means of compressed air which operates a shaking mechanism, giv-

ing each bag a thorough mechanical cleaning, in addition to the reverse air current which is controlled by an auxiliary valve. This valve closes the main air passage and opens the cylinders to the atmosphere. In the cylinders which are under partial vacuum the admission of atmospheric pressure forces the air in the opposite direction from that indicated in the figure and completes the cleaning process. This is done every 4 or 5 minutes, the cleaning period lasting about 4 to 5 seconds. The time and duration of each cleaning is automatically regulated by a timing mechanism and the pressure carried is from 30 to 35 lbs. In many plants this pressure can be obtained by reducing from the compressed air line. In plants where there is no compressed air supply, this installation requires a small air compressor and air receiver.

The advantages of this 100% efficiency system are as follows

1. No material pulled into fan. The fan handles only pure air.
2. Reduced fire and explosion hazards.
3. All dust is collected by the apparatus under a partial vacuum.



The NORBLO Suction Filter
More material can be recovered with this equipment than with any other known medium.

4. This equipment furnishes any classification of material desired.
5. This equipment furnishes two kinds of finished material if desired, at the same time.
6. Less power per ton than with any system known, consistent with total recovery.
7. Cost is reasonable.
8. Upkeep is small on renewals or repairs.
9. Maximum capacity consistent with a minimum of power, floor space, and operating expenses.
10. No waste of material.
11. Less floor space per tonnage required.
12. Absolute control of air without changing the speed of the fan.

An interesting application of the same line of equipment has recently been developed by the Clark Dust Collecting Co. in connection with powdered coal, where the material is ground, and the fine dust resulting in the grinder is picked up from the expansion chamber, through a system very similar to the one outlined above. Several of these systems are now in successful operation.

These systems are a remarkable improvement in the line of air conveying, separating and dust collecting, where it is a question of handling material in powdered form in a sanitary and efficient manner, and should be investigated by all progressive executives in the cement industry.

Dust That Is Breathed by Workers

An investigation of the various types of respirators used by workers in numerous industries in preventing the inhalation of injurious dusts is to be undertaken at the Pittsburgh, Pa., experiment station of the United States Bureau of Mines.

Stone dusts and metal dusts that are breathed by miners, stone cutters and metal polishers have been the cause of much pulmonary disease, incapacitating many workers and at times resulting in early deaths. While the best preventative is to eliminate formation of dust or to stop it at the source, nevertheless numerous situations exist where respirators are serviceable in preventing inhalation of injurious dusts suspended in the air. The respirators are mostly of the "pig snout" type that form a cap of metal, rubber or cloth over the mouth and nostrils so as to cause air filtration through a sponge, paper, fabric or metal gauze.

Investigators have learned that the finest particles of dust, of a size far too small to be seen by the unaided eye, are the ones that lodge in the lungs and do most damage. At present little is known of the merits of the different filters used for respirators and workmen often prefer to protect themselves with a towel or handkerchief tied around the face. In the proposed tests by the Bureau of Mines find particles such as compose tobacco smoke and fine mineral dusts suspended in air will be filtered wth the different materials. The relative effectiveness of the filters will be noted as their resistance to passage of air and tendency to clog. The information obtained may be used to design more effective dust respirators. Eventually a respirator may be evolved that is simple in form, adaptable for fitting a wide variety of facial contours, of high dust removing efficiency, and that gives little resistance to breathing.

The tests to be made by the Bureau of Mines will be conducted by S. H. Katz, assistant physical chemist, and L. J. Trostel, junior chemist, under the direction of A. C. Fieldner, supervising chemist.

Dry Vacuum Pumps

The Sullivan Machinery Co., 418 Peoples Gas Bldg., Chicago, make the following announcement:

"This company is bringing out a line of Dry Vacuum Pumps in both single cylinder and duplex type. Bulletin 78-A has just been received from the printer, in which the single cylinder machines are described.

"It will be noted that these are equipped with the Sullivan Improved Wafer Type Plate Valve for both intake and discharge openings, and that the machines are built in both steam and belt driven types, with all moving parts enclosed, and fully lubricated by the splash method.

"The Sullian Turbinair Hoist is another new product which we are just putting on the market. It is described in Bulletin 76.

"These Hoists find a wide range of use in mining both for coal and metal, and in many phases of industrial work. Photographs or cuts are also available. The use of a Turbinair motor for Hoists of this character is a distinct novelty and possesses numerous advantages some of which are mentioned in the bulletin."

Concrete Tower Built to Support Revolving Crane

A reinforced-concrete tower was recently built in the center of the clinker storage yard of the Riverside Portland Cement Co. near Riverside, Cal., to support a cantilever crane which is used to pile clinker or to deliver it to a continuous belt conveyor. The crane proper is built of structural steel, but the tower was made of concrete because concrete was cheaper, would be effected less by hot clinker piled around it and would require less maintenance.

The tower is circular in section, 55 ft. high, and has an inside diameter of 30 ft. The walls are 2 ft. in thickness except at the parapet where the thickness

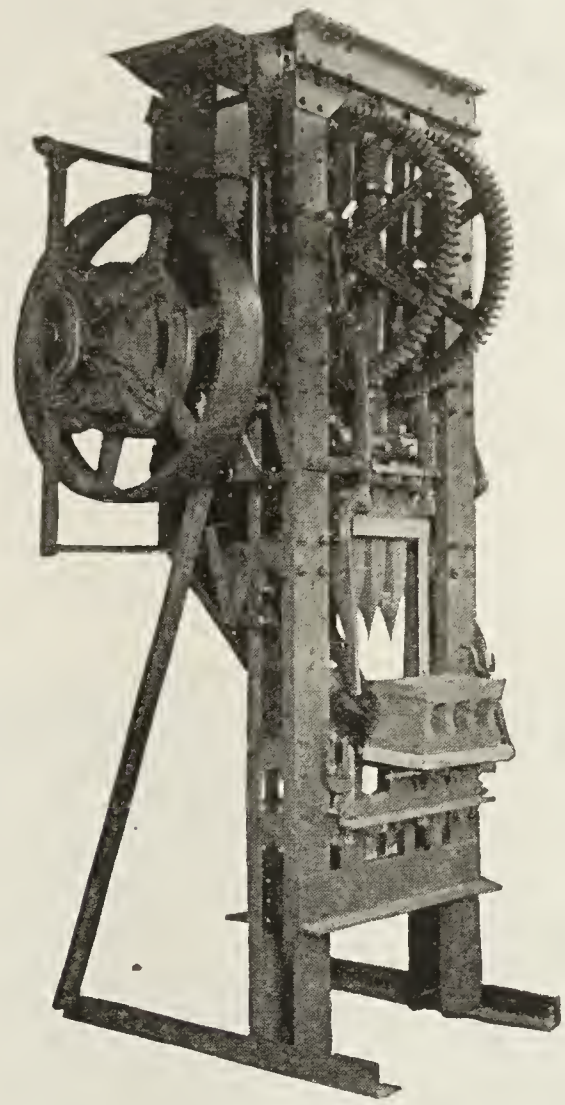
increases to 3 ft. The foundation extends 4½ ft. below the ground level and has a diameter 4 ft. greater than the superstructure. A 6-in. diaphragm of floor supported on beams is located 7 ft. below the top of the tower.

The revolving element, which weighs 140 tons, is supported on a track laid on ties placed radially around the parapet. The two crane arms are each 110 ft. long and operate 50-cu.ft. grab buckets. When operating both buckets, the capacity of the crane is 6,000 bbl. per 10-hr. shift. The seven motors on the crane, ranging in capacity up to 40 hp., are said to cause no vibration.

Post Economy Punch Now Manufactured by the Kent Machine Company

The sole manufacturing rights covering the Post Economy Punch, which is a semi automatic machine for producing building block and tile, have been transferred by the Post Manufacturing Company of Kent, Ohio, to the Kent Machine Company, whole plant is also located in the same city. This machine is the invention of Mr. Alvah L. Post, who is also the originator of the Kent Continuous Mixer, a machine well known in the concrete products industry and in use in many plants thruout the country. The block and tile machine which Mr. Post has invented is simple in design, almost noiseless in operation and is built to stand years of continuous service. It produces units exceedingly dense and uniform in structure, free from voids, absolutely square and smooth and which stand the tests required by the most exacting building codes in the country.

Mr. Post is an experienced cement products man. His later invention is thought to be superior to any machine on the market for making block and tile, both so far as ease of operation and the quality of the product is concerned. Also the cost of producing units on this machine is surprisingly low. The operator simply places a pallat in the mold box and pulls a lever which releases the clutch allowing the machine to make one complete revolution. During the complete revolution tapering plungers are forced into the mold box, thereby, distributing and forcing the material into its



proper shape. The block is then automatically stripped and may easily be removed on the pallat. The complete cycle of operations requires only 10 seconds and a production of six complete blocks per minute may readily be obtained.

The Kent Machine Company are particularly fortunate in securing the manufacturing rights for this type of block making machine which with the Kent Continuous Mixer makes a combination of units giving almost an ideal type of installation for Concrete Products Plants. Both machines are labor saving devices and production of both is high. The Kent Machine Company are planning to manufacture this machine in large quantities as they anticipate that the sales agents will be able to place a number of these machines in the near future.

Mica for Concrete Surfaces

U. S. Mica Mfg. Co., 14 E. Jackson boulevard, Chicago, is distributing a folder giving valuable information on the use of ground mica for surfacing ornamental concrete work. In an article written by P. Zinner, master mechanic, Lincoln Park board, Chicago, methods of manufacture used in the production of the beautiful concrete lamp posts placed in Lincoln Park are fully described and commented upon. Anyone interested in the manufacture of ornamental concrete should write for this folder, which will be sent free upon request made to the company.

New York Building of Dodge Transmission Machinery

The Dodge Sales & Engineering Company of Mishawaka, Indiana announce that the excavation for their new $1,000,000 building in New York City at 49 Park Place is practically completed. The new building will occupy 165 feet on West Broadway, 50 feet on Murray Street and 75 feet on Park Place. Present plans call for twelve stories but foundation and construction will permit of an additional four stories if needed. The location of the new building is very convenient as it is located within two blocks of four Elevated Stations, one-half block from Church Street Subway Station and two blocks from City Hall square and three blocks from Hoboken Ferry.

The basement of the building and part of the first three floors will be used by the Dodge Sales & Engineering Company as a warehouse, and for the sales and distribution of Dodge, Oneida and Keystone products for the mechanical transmission of power, covering both domestic and export needs. The products of the Dodge Sales and Engineering Company include

pulleys, rope drivers, hangers, shafting, bearing, couplings and heavy oil engines, and are all distributed, in the main, through six hundred dealers who feed from the various branches of the organization located in nearly every large city in the United States. The branches all carry large stocks in their warehouses of factory power transmission devices which enables the dealer to carry in stock, and supply on short notice, any form of unit used in the mechanical transmission of power in any factory. Most of these units are standardized and the service which Dodge is thus able to render is prompt and efficient in every degree.

For sometime past the export business of the Dodge Sales & Engineering Company, which has been under the direction of Mr. S. A. Emery, manager of the present branch at 21 Murray Street, has been showing a very healthy and satisfactory growth and the new quarters of the organization will permit of the prompt filling of all foreign orders.

The new building will probably be known as "Power & Transmission Building" as it is the intention to make this building a new center for the sale and distribution of factory and mill supplies for power and transmission purposes, including belting, factory and mill supplies and machinery and allied hardware lines. Occupancy is expected by May 1st, 1922 and The Dodge Sales & Engineering Company have already received many inquiries from the industries about space rental in the new building.

The erection of this $1,000,000 building at the present time reflects the absolute confidence felt by Dodge officials in the present upward trend of business and in their very best efforts to fill a demand for larger and more adequate facilities be provided for users of Dodge, Oneida and Keystone products in the United States and Canada and for export trade also.

Catalog on Big-Blast Hole Drills

The Sanderson Cyclone Drill Co., Orrville, Ohio, has just issued Catalog B-46 on Big Blast Hole Drills and their application to quarry, open pit mining and heavy rock excavation. This catalog is now ready for distribution to the trade.

The catalog, besides containing a detailed description of Cyclone drills, goes exhaustively into the subject of the big blast hole drilling and presents considerable valuable information on that subject. Special emphasis is laid on the subject of drilling costs and the examples giving operating and cost data should prove to be a valuable asset to all quarrymen.

The book also goes into complete detail on the subject of blast-holt drilling versus snake holing and blast-hole drilling versus gopher holing. It treats the subject very conclusively and clears up many doubtful points. Besides the above, the book treats with the factors and conditions that govern big blast-holt drilling and also deals with the physical properties of the rock. This book should be in the hands of every producer who finds it necessary to drill and blact rock.

Stone and Lime Handling Machinery

It will be of particular interest to readers of CEMENT & ENGINEERING NEWS, to know that there has just been published by the Link-Belt Company of Philadelphia and Chicago a new book called "Link-Belt Stone and Lime Handling Machinery."

The book is divided into two sections, the first section devoted to Stone Handling and the second to Lime Handling.

Illustrated and briefly described in this book are typical installations of elevating and conveying machinery for the handling of Stone and Lime, as well as some of the elements used in their construction.

The Link-Belt Company being pioneer builders of elevating and conveying machinery took the lead in adapting it to the handling of Stone and Lime.

Anyone interested in this subject can obtain a copy of this book by addressing the Link-Belt Company either Philadelphia or Chicago.

The Care of Wire Rope

By George S. Whyte*

Since wire rope is expensive, great care should be used in handling this very imporatant material. Just as soon as a coil or reel of it is received, it should be examined carefully in order to ascertain whether or not it has been injured in transit. Quite frequently it is injured seriously by careless handling. To make the examination suggested upon receipt of every shipment is well worth while.

When the rope is to be installed, the reel should be mounted and the rope pulled off. Under no consideration should it be taken off the reel in any other way. It is a very simple matter to mount the reel. All that has to be done is to obtain a shaft, push it through the center hole, and elevate the reel upon a couple of "horses."

If the rope is received in coil form, it should be placed upon a turntable and unwound, or it should be rolled along the ground like a hoop. To improvise a turntable by utilizing an old wagon wheel for this purpose is a simple matter. The reason that it is so important to have wire rope unwound carefully is that the rope is liable to become kinked. Once a wire rope is kinked its usefulness is practically gone, because when a kink is made the reliability of the rope at that point is practically destroyed. The result is that the entire rope oftentimes is useless.

If attachements have to be applied to the rope, great care should be used in their application, because, unless an attachment is properly applied, there is great liability of placing an undue strain upon a few of the strands. The attachments should be made carefully so that an even tension will be applied to each and every strand when a load is being hoisted.

Complete instructions will be found in the catalogs issued by the various wire rope manufacturers with reference to the best method of attaching sockets and applying clips. When clips are used a thimble should always be used in connection with them. It is not good practice to pass the rope through the becket of a block or through the eye of a hook without using a thimble to keep the rope in shape.

Wire rope is very frequently injured materially on account of the grooves in sheaves and drums not being properly cared for. When a wire rope has been in use for a long time, it naturally becomes slightly smaller. Wire rope is harder than the metal in drums and sheaves. The result is that when a rope wears and becomes smaller in diameter, the grooves also become smaller. If, therefore, a new rope is installed and the grooves in the drums and sheaves are not carefully examined and changed in case the grooves are too small, serious injury to the rope will result.

The lubrication of a wire rope is just as necessary as the lubrication of a machine bearing. A wire rope that is not properly lubricated will deteriorate very rapidly. The method of lubricating a rope is very simple. Complete instructions will be found in various wire rope catalogs as to the best method of applying a lubricant.

All wire rope used for hoisting purposes should be examined periodically. It is not wise to take any chances with reference to the condition of a rope. The simple construction enables anyone to determine rapidly whether or not the rope is safe. The frequency of these inspections must be determined upon by the engineer in charge. In many places, particularly in mine hoists, inspections should be made daily, whereas, on derricks, weekly, or even monthly, inspections are sufficient.

Strict instructions should be given by the engineer to his superintendent to report whenever a wire rope has been subjected to an undue strain. This frequently happens when the boom of a derrick is being lowered, and it is liable to happen at any place where a wire rope is being used for hoisting purposes. A sudden stop or a severe jerk is liable to strain a rope beyond its elastic limit. Should this occur, and to allow a rope to remain in operation is extremely dangerous, because it is liable to break at any moment even with a comparatively light load.

When a wire rope is received, it should be covered thoroughly with grease and stored in a dry place providing it is not going to be put into use immediately. The same procedure should be pursued when a rope is taken off, providing it is not worn out, but is to be used upon another job. A little care in this particular will add considerably to the life of the rope.

*President Macomber & Whyte Rope Co.

Fuel Oil Engines

The Hadfield-Penfield Steel Company, Bucyrus, O., has issued two catalogs describing and illustrating their Diesel Type Horizontal and Vertical Standard Fuel Oil Engines. The Engines are built on the two cycle principle with a cross head which also serves as a pumping piston for furnishing air to clean out and fill the main working cylinder.

The Horizontal Engine is built in three sizes of cylinders and of 50, 75 and 100 B.H.P. The latter two sizes being built as Twin Units, giving 150 and 200 B. H. P.

The Vertical Engine is built in two cylinder sizes—50 and 125 B.H.P. per cylinder and in from two to six cylinder units.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

OF CEMENT AND ENGINEERING NEWS, published monthly at Chicago, Ill., for October 1, 1921.

State of Illinois } ss.
County of Cook }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared John F. Waldron, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the Cement & Engineering News and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Wm. Scafert, 22 Quincy St., Chicago, Ill.; Editor Wm. Seafert, 22 Quincy St., Chicago, Ill.; Managing Editor, Wm. Scafert, 22 Quincy St., Chicago, Ill.; Business Managers, John F. Waldron, 22 Quincy St., Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) Wm. Seafert (sole owner), 22 Quincy St., Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

J. F. WALDRON
Business Manager.

Sworn to and subscribed before me this 22nd day of September, 1921.
[Seal.] Frank W. McVicker,
(My commission expires February 20.)

Concrete Road Construction

By GEORGE A. CURTIS

District Engineer, Division of Highways, Pittsfield, Mass.

In presenting this subject it may not be amiss to consider briefly the factors which enter into the choice of concrete as the proper type of building material. These factors include: (1) the average annual cost; (2) the possible use of the old road as a foundation for bituminous or other surface, after the original has become unsatisfactory; (3) the ease of maintenace: (4) the character of the ground over which the road is built.

A road that is subject to freshet conditions is likely to deteriorate very rapidly, but concrete road is especially adapted to these conditions. Furthermore, the tractive resistance on concrete roads is usually low.

Having chosen this type, we will now consider the determining factors which will give the best results for the money expended.

Location, Fine, and Grade.

Although the principles involved are not different from those in other types of construction, it should be borne in mind that this surface is perhaps of a more permanent character and should receive more careful attention. Attempt should be made to keep the curves of as large a radius as practical, and to avoid reverses. It is desirable to maintain an unobstructed view of at least 200 ft. from any point along the travelled way.

Drainage, Foundation, and Subgrade.

The word drainage in this connection should always be spelled with a capital D. It is, by all engineers, agreed to be the most important phase of road building.

Our object is to obtain, as nearly as local and financial conditions will permit, a dry foundation that will furnish a uniform bearing power for the pavement. Special emphasis should be placed on the word "uniform." All soils heave to a greater or lesser degree, but the non-uniformity of heaving due to the varying textures of the materials forming the subgrade, is what causes the concrete to crack badly. Clay is known to heave excessively, but if the subgrade is composed entirely of this material, such as is the case in some of our western states, no particular trouble will be experienced, as the entire road heaves uniformly.

In general, concrete should not be built on any except the shallowest fill, even though built up in thin layers and thoroughly rolled, unless the embankment is so placed in the fall, with the idea of concreting over it as a subgrade the next year. Care should be taken before concreting to loosen up the surface for the depth of 6 inches or more

ROAD CONSTRUCTION

A typical stretch of concrete road partially completed.

and re-roll. This is for the reason that the center will have become more compact by the travel than the sides and so will settle non-uniformly after the concrete is laid, unless this precaution is taken.

Drainage is composed of 3 items: water flowing to the road from the outside areas; rain falling on the road itself; and underground water. The governing thought should be to care for the water quickly, thus lessening the effects of alternate freezing and thawing, saturation and drying out of the soil.

The best method of applying concrete may be summarized as follows:

For a light soil, lay the concrete directly on the subgrade, being careful to see that the subgrade is clean, and use a side ditch, the bottom of which is slightly lower than the bottom of the concrete.

SCENES DURING CONSTRUCTION

This illustrates how only one side of the road is closed to traffic.

For a medium soil use about 3 inches of clean gravel or cinders under the concrete in connection with the open ditch, the bottom of which is lower than the gravel course.

For heavy soils use not over a six inch layer of porous material under the concrete and an open ditch or blind drain of sufficient depth to quickly drain this and lower as much as possible the level of the ground water. The porous material used under the concrete should extend entirely through the shoulders.

Cross Section.

Our best practice would seem to indicate that for our main roads, the width should be from 18 to 20 ft. with a thickness of 6 inches at the side and about 8 inches at the center. The crown, of approximately ¼ inch per foot, is in the form of the arc of a circle.

Secondary roads may be up to 18 ft. in width, 5 inches thick at the side, and about 7 inches at the center.

Aggregates and Proportions of the Mix.

As the life of the concrete depends primarily on the quality of the materials of which it is composed, too great care cannot be exercised in their choice. All available approved methods of testing should be utilized. Samples of sand should be collected and forwarded for laboratory tests.

This sand when mixed with cement to make a 1 to 3 mortar should show a tensile strength at least equal to that of standard sand, similarly mixed.

The quality of the stone should be obtained by forwarding test samples to the Department of Agriculture, Bureau of Public Roads, at Washington. The two principal tests to which it is there subjected are the Deval abrasion test, and the toughness test. The Deval test is made to determine the percent of wear and the French coefficient of wear. This is accomplished by placing the samples in a cylindrical drum which is given 10,000 revolutions, after which the loss in weight due to wear is determined. The French coefficient is then stated as 40 divided by the percent of wear. Standard practice demands that this coefficient shall be not less than 8.

The toughness test is made to determine the resistance which the material offers to fracture due to impact. This test is useful in determining the comparative resistance of the rock to the impact such as produced by the action of horses' hoofs. Uniformity in the qualities of these aggregates is very important in order that the pavement should wear evenly.

The grading has always been disposed of in our work by arbitrarily calling for the proportions as 1 : 2½ : 5. 1 : 2 : 4, etc. If one inch stone is available the same proportion is used as if two inch stone were used, although the percent of voids in the two may vary considerably. Tests have shown that with a given proportion of cement, wide variation in the quality of the concrete can be had from differences in grading of the aggregates.

The addition of hydrated lime makes the concrete more impervious. Amounts up to about 10 percent tend to increase the strength somewhat when the mix is of dry consistency. The addition of 15 percent tends to lower the strength.

Mixing, Placing, and Finishing.

The main points to look after in the mix are the amount of water used and the time of mixing. A large number of tests have conclusively proven that the strongest concrete is obtained with a rather dry mix, further described as one which will not tend to make the inspector over popular with the men operating the screen. An increase in the amount of water used very materially decreases the strength.

As tests show a practically uniform increase in strength with increased time of mixing up to a full minute and only slight additional increases for longer mixing, it is considered that one minute should be specified as the required time.

Before placing the concrete the subgrade should be thoroughly wet. Forms of a depth equal to the full side depth of the concrete should be used, the same being firmly and accurately set for line and grade.

After the material is deposited on the subgrade, it should be levelled and screeded as soon as possible with a template cut to the desired crown of the finished surface. Any depression then occurring should be filled and the whole re-screeded.

Immediately after the concrete has set, it should be rolled to get rid of the excess water. This rolling should be done at least twice, with only a short interval between rollings. The surface is now ready to be finished with the belt, a method which is strongly recommended. About one-half hour later the surface is slightly roughened transversely by brooming lightly with an ordinary rattan

LAYING THE CONCRETE

Showing how concrete is carried from mixer to workingmen who lay it.

MAKING THE CROWN

Illustrating the use of the template.

push broom. This is done in order to give a slightly rougher surface and make the pavement less slippery.

Curing.

The method to be employed is dependent on the temperature. In exceedingly warm weather when the sun is very bright, it may be necessary to use a canvas protection until the surface has set sufficiently to receive the covering which is to be left on for a period of about two weeks. This covering may be of hay, straw, sawdust, or earth and should be kept wet during this period.

In level country curing by the ponding method is successfully used. This is accomplished by building little dikes so that the pavement may be flooded to depth of about 2 inches over the crown. I believe this to be the best method where it is practical to use it.

When the temperature gets down to 35 degrees, no concrete should be laid without heating the material. No concreting should be done on a frozen subgrade.

Special canvas or strips of tar paper should be available for protection in case of a sudden rain, before the concrete is set sufficiently to cover. This tar paper is also sometimes used for covering when the temperature is falling rapidly toward the freezing point and the concrete is getting its initial set slowly. It is then covered with hay.

The finished road should not be opened to traffic before 3 weeks' time even in warm weather. In cool weather, this period should be lengthened. If it appears necessary to open the road to travel at the end of three weeks, when the temperature for setting has not been favorable, the surface should be protected by an insulating or shock absorbing layer of earth six inches or more in thickness.

Joints and Reinforcement.

Many laboratory tests have been made which, in connection with actual construction experience, would seem to indicate that concrete contracts more in setting and drying than it ever afterwards expands from the combined effects of high temperature and moisture.

Observed results indicate that contraction cracks occur at intervals of from two to three times the width of the club. As a straight crack is much more slightly than an irregular one, joints should be placed every 35 to 40 ft. These joints need be only the thickness of a piece of tar paper. Joints should be square across the road and perpendicular to the top surface.

Standardized Elevators and Conveyors

The Dodge Sales & Engineering Co., Mishawaka, Ind., announces the publication of a catalog on Dodge standardized elevators and conveyors. The catalog is one of the most comprehensive ever issued covering the above subjects and should constitute a text book. Tables of data incorporated represent an immense amount of work. The tables are based on maximum conditions for the different carrying parts, rather than assuming conditions and working out a design for that particular condition. An interesting feature is the simple manner in which designs involving gearing are worked out, whereby almost any drive, whether for a conveyor, elevator or other speed reduction, can be picked out of the tables; pitches, numbers of teeth and shaft sizes. All details are thus solved without any complicated calculations. The catalog contains 160 pages and about 150 illustrations. It has been in preparation for over a year and a half and was prepared under the direction of A. O. Gates, M. E.

Repairs Shipped by Aeroplane

"At 8:30 one morning a telephone call was received by Allis-Chalmers Manufacturing Company, Milwaukee, from the Lutz Stone Company, Oshkosh, Wisconsin, regarding repair parts for one of their rock crushers, the plant being shut down. The parts being in stock, Mr. Lutz of the Lutz Stone Company stated that he would call for them within an hour. This was somewhat of a surprise as Oshkosh is more than three hours distant by train. According to his request, however, the parts were delivered to the Milwaukee Air Port, seven miles from the Allis-Chalmers Plant within forty-five minutes after the call was received. Mr. Lutz called for the parts in his aeroplane, and upon reaching home was able to have his plant in operation shortly after noon."

The following letter was received later from the Lutz Stone Company:

I write this letter to compliment you on the extraordinary service rendered in delivering the pinion gear to the Gilles Meisenheimer Flying Field in response to my telephone call.

After talking with you I took it for granted that I had plenty of time regardless of the fact that I had eighty miles to go against your seven. However, it took about half an hour to fill the gas tank which happened to be empty and due to the fact that the wind was directly from the south it took almost an hour to make the flight. Immediately upon landing I made inquiry and found that the part had arrived long since. Strapped it to the side, hurried back and had the plant running shortly after lunch.

Kindly accept our thanks for the service which I assure you was sincerely appreciated.

Explosive Proof Against Freezing

The Du Pont Company has developed and perfected a formula for the manufacture of straight dynamite which results in that explosive being proof against freezing even in zero temperatures. As a consequence of this development, the company has determined to discontinue the manufacture of its former straight dynamite and hereafter all this kind of explosive will be made by the new low-freezing method. The perfection of the formula is the result of years of experimentation in the laboratory and in the field and marks one of the greatest advances in the art of explosives manufacture. Straight dynamite has for years been the standard of the world in nearly every kind of open work, but a disadvantage has been its liability to freeze at temperatures below fifty degrees Fahrenheit. As any dynamite loses some part, if not all, of its efficiency when chilled or frozen, many attempts have been made to make it low-freezing. The perfection of the new "powder" by the Du Pont Company makes it possible to use straight dynamite the year round in industrial operations. Thawing, with its loss of time and attendant dangers, has practically been eliminated. The new explosive has been fully tested and proved and the formula for making it has been made standard in all the plants of the company producing dynamite.

News of the Cement Mills

"In common with many other places in the tropics, concrete has been found to be the building material best suited to the Philippines. Such construtcion is probably best of all for withstanding earthquake disturbances, is uninflammable, unaffected by moisture, and will withstand the attacks of rats, white ants and the like. The absence of good building brick or stone, or even wood at a reasonable price, makes Manila all the more dependent on cement," writes J. C. Witt, Technical Director, Rizal Cement Co., Manila.

"The consumption of cement, in relation to the total amount of all kinds of building materials, has been very great. All the new, more important buildings in Manila are of concrete, and it seems unlikely that any other material will replace it. The Philippine Government is the greatest consumer. During 1911, for example, the Bureau of Public Works alone used over 73,000 bbls. (This does not include the city of Manila.) This amount was distributed as follows: Roads, 2,492 bbls; bridges and culverts, 33,250; buildings, 32,341; irrigations, 3,610; miscellaneous, 1,424.

"Until about 5 years ago, every barrel of cement was imported. It came from the United States, Europe, China, Japan and India. The amount imported from 1908 to 1917, inclusive, is shown below.

The machinery arrived in Manila the latter part of 1914 and erection was at once begun, though some important parts were delayed in shipment. The first cement was placed on the market in July of the following year.

"The plant is at Binangonan, Rizal, on the eastern shore of *Laguna de Bay,* a large fresh-water lake, about 22 miles from Manila, and one hours' ride by automobile over the Manila-Morong road. Direct water transportation to Manila and the sea board is available via the Pasig river—the most important inland waterway in the Philippines. *Cascos* towed by steam launch make the trip from Manila in 4 or 5 hours, taking coal and other supplies to the plant and loading cement for the return trip. The nearest railroad station is at Taytay, 9 miles distant. The company maintains offices in Manila, and warehouses at both Binangonan and Manila, so that fairly large deliveries may be quickly made. The main buildings are frame with sides and roofs of galvanized iron, and concrete floors. Additions made from time to time are of concrete, and it is the intention to gradually replace all construction with that material. In the Philippines the only function of manufacturing buildings is protection from the sun, and from rain at certain seasons of the year.

	Year and approximate number of barrels										
Imported from—	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	Total
United States	.....	429	88,415	631	172	8	43	24	73	36	89,831
United Kingdom	5	8,166	2,079	2,855	237	58	.....	.....	.....	16	13,416
Germany	9,497	10,016	22,301	40,336	101,351	213,507	84,547	.....	.....	.....	481,555
France	422	48	144	158	205	396	146	20	.....	.....	1,539
Spain	.....	48	47	.....	68	97	.....	72	6	5	343
Italy	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Belgium	7,727	6,491	2,414	1,661	2,240	4,081	633	.....	.....	.....	25,247
Netherlands	4	528	.....	.....	.....	.....	.....	.....	.....	.....	4,495
Russia	2,097	1,123	241	1,034	.....	.....	.....	.....	.....	.....	4,495
China	.....	39	4,378	121	11	2,849	57,630	56,544	44,247	72,819	238,638
Hongkong	130,198	146,158	163,465	271,416	200,799	124,250	83,415	82,625	34,839	26,067	1,263,232
Japan	217	2,671	2,770	3,577	2,499	28,993	84,547	122,764	104,487	19,950	372,475
Dutch East India	.....	.....	.....	.....	.....	.....	50	.....	.....	.....	50
British East India	6	334	25	.....	.....	746	.....	.....	.....	11	1,122
French East India	.....	17,453	68,998	79,723	58,574	48,759	25,210	32,183	17,440	25,185	373,525
Austria-Hungary	.....	.....	.....	32	.....	.....	.....	.....	.....	.....	32
Japan-China	.....	.....	.....	.....	149	127	3,319	806	.....	.....	4,401
Total	150,174	193,504	355,277	401,544	366,305	423,871	339,540	295,038	201,092	144,089	2,870,434

*Computed from data obtained from the Bureau of Customs.

"In 1910 some men who for several years past had been observing conditions in the Philippines, organized the Rizal Cement Co., the first company for the manufacture of cement in the Islands, and incorporated Dec. 5, 1911. The company is cosmopolitan. About 60% of the stock is owned by Spaniards; 20% by Filipinos; 12% by Chinese, and the remainder by Italians, English and Americans. The president is a Filipino, and the general agents are Chinese. Most of the several hundred men at the plant are Filipinos, but there are two Spaniards, two Germans, four Japanese, three East Indians, and two Americans. The official language of the company is Spanish. All records, reports, correspondence, and the like are in that language. Three or four other languages and several native dialects are also spoken. Although the plant is small, the total investment in land, quarries, buildings, and equipment is about $1,000,000.

"The entire equipment was purchased in Europe. This includes the mill machinery proper, barrel manufacturing machinery, an aerial cableway for transporting limestone, electrical equipment and power plant.

"Raw Materials.—The raw materials are limestone and volcanic tuff. A small amount of river sand is also added to raise the silica content of the mix. The limestone is a hard stone of uniform composition, averaging over 97% calcium carbonate. It is easily quarried, since there is practically no overburden, and is carried 4½ miles to the plant by cableway. The tuff is quarried at the site of the plant. At present it is necessary to import coal and gypsum. They are obtained from Japan.

"Equipment, and Process of Manufacture.—The power plant is equipped with two 600 h. p. compound steam engines. The heavier machinery on both the raw mix and clinker side of the plant is connected to the main shaft. The remainder is driven by motors. Two 390-kw., 460-volt, alternating-current generators furnish the current.

"The limestone and tuff are separtely run through a jaw crusher and elevated to storage bins by bucket conveyor. The bins connect with a hopper scale where the two materials are proportioned on the basis of their analyses, and mixed.

"The mixture is passed through a rotary dryer, and

then through two ball mills placed in parallel. The grinding is completed in a tube mill. At present one kiln is in operation. This is 145 ft. in length and has a clinker capacity corresponding to 500 bbls. of cement. It is the intention of the company to install another kiln of the same type later. The fuel is powdered coal. This is prepared by passing first through steel rolls, then through a rotary driver, and finally through two ball mills placed in series. The clinker is cooled in a rotary cooler, and is ground in a compound mill—a combination ball and tube mill. In the first part of the mill, the clinker is reduced from its original size to about 30 or 40 mesh; in the second part, the operation is completed. The cement goes to a wind separator before it reaches the storage bins. There are six of these, each having a capacity of 2300 bbls.

"The cement is packed in barrels. From time to time a small amount was packed in water-proofed bags, but they did not give complete satisfaction. Atmospheric conditions are not favorable, and sufficient moisture penetrates the bag to cause the cement to become caked. No Rizal cement has been exported, but it is frequently exposed to a several days' sea voyage in being taken to various parts of the Islands.

"The company operates its own coopearge shop. This has a capacity of 1000 bbls. per day and is well equipped with modern wood-working machinery. All the parts of the barrel except the hoops are cut directly from the log, and the greater part of the work of assembling is done by machinery.

"Through an American cement manufacturer on visiting the plant would find many novelties, these are mostly due to the dress of the laborers, the quaint appearance of the *cascos* or freight lighters, and the methods of discharging cargos. In common with most industries in the Orient where labor is cheap, many operations are done by hand labor which would be automatic in America. Aside from this, the operation of a cement plant in the Philippines soon becomes much as it is in America. There is the big advtanage of being able to sell cement the year around, since construction is never stopped on account of freezing weather, and consequently large storage bins are not needed.

"There seems to be no cause for labor troubles. A number of the laborers in the vicinity of the plant are earnest and conscientious with their work but as a class they are happy, carefree, and independable. They do not realize the importance of the industry even in these days when so much is heard about industrial independence. At times—on *fiesta* days—the whole plant must close down because laborers are unobtainable. They have formed a union, which so far has little organization, but has all the disadvantages with none of the advantages of the advantages of such bodies elsewhere. The teething stage is painful alike to employers and to the employed. It is often said that cheap labor is most expensive in the end. The islands furnish numerous examples of this. With labor at 40 to 50 cents per day and, at places even less, and with machinery unusually expensive, because of transportation and erection charges, many companies have made the mistake of depending too much on hand labor. The result has been high cost of production, and at times expensive shut downs. The present tendency, however, is to make every process as nearly automatic as possible.

"High freight rates have tended to keep out much imported cement and have thus decreased competition to some extent, but they have also resulted in a coal shortage with its attendant high prices of that commodity. This more than offsets any advantages gained by lack of competition, because the price of cement is so high, that very little is being used as compared with former times. At present cement sells in Manila at $6 to $8 per barrel.

"Recently the money situation caused considerable annoyance, especially in industrial communities. Due to the advanced price of silver, the metal in the silver peso, the unit of the Philippine money system, became worth more than the face value of the coin. All silver coins commenced to be hoarded, and it was difficult to obtain change for paper money. Laborers began to demand payment in coin. A more serious situation was averted by the Government issuing emergency paper money and calling in all silver pesos and fractional coins. Later the paper money was replaced with silver."

At the plant of the Dixie Portland Cement Co., Richards City, Tennessee, the wet process is used. The method of controlling and feeding the mix has some unusual and interesting features. The raw materials are shale and limestone.

When delivered to the cement plant, the material is stored in large concrete bins, placed in two rows. There are two shale and two limestone bins. From the bottom of each of these bins, the material is fed to belt conveyors—the quantity being controlled by table feeders and governed by an anaylsis of the material.

These belts convey the material to a battery of Williams mills where a further mixing is effected and the preliminary grinding is done. The combined product is delivered to one of two dryers where the proportioned limestone and shale is prepared for pulverizing. The raw grinding is done in a battery of 30-in. Griffin mills.

The product of the Griffin mills is elevated by an inclined belt to a pug mill. Here the dry material is agitated as it is mixed with water until it is a thick paste, which is ground in a battery of tube mills. Ten small preliminary slurry tanks are provided for the finished slurry.

Two 1000-bbl. capacity tanks enable a mixture of two or three of the preliminary tanks. The ten small tanks are analyzed and then pumped together into a larger one so as to give the desired mix. Several centrifugal slurry pumps are used to shift the material.

The slurry is fed to the kilns by gravity from a special feed tank. One of the views will show the feed tank as it appears in operation. There are eight kilns and each kiln has a separate pipe to this tank and the quantity of material fed into each kiln is regulated by a valve. The feed tank is about 25 ft. above the kilns and in the rear about in the plane of the stacks so that the feed pipes to the kilns are almost vertical.

The feed tank is open on top and there is a separate pipe to each kiln so that the quantity being fed into any kiln is easily regulated. A man is stationed on the platform where he can regulate the feed so that it is always constant and keep the pump from overflowing the tank. The tank is small so that the material flows through it so quickly that there is no chance for it to settle or vary in mix. Samples of the feed are made at frequent intervals and so a final check of the material is obtained.

The feed pipe enters the kiln through a round section of smaller diameter than the kiln itself, which fits in at the end of the kiln between the rotary part and the stack. One of the views shows how the feed pipe connection is made. [Rock Products].

Traveling in the interests of the Asano Portland Cement Company of Tokyo, Japan, Mr. Kichizo Iwaya, manager of the expert sales department, and Mr. H. Nakagawa, superintendent and chief engineer of that company, arrived in Riverside, Calif. last month.

They visited the cement companies in Victorville, Colton and Riverside, Calif.

Mr. Iwaya, who is a graduate of Harvard University, stated that the daily output of his company is more than two-thirds the entire output of cement in Japan. The Asano Portland Cement Company has seven plants in seaport towns throughout Japan, producing collectively 22,000 barrels of 88,000 sacks of cement daily.

"One thing that Japan must do," Mr. Iwaya stated, "is to conserve her fuel. There is an endless supply of water power available in Japan. This has been utilized more extensively since the cement plants have been constructed than heretofore. With the recently constructed power plants in operation, the broad fuel conservation program that has just been instituted is proving very successful."

Mr. Iwaya and Mr. Nakagawa will go to New York before returning to Japan.

Actual operations for the erection of the plant for the Signal Mountain Portland Cement Company, one of Chattanooga's largest enterprises, will be started about December 1, according to plans announced by Ralph Law, Secretary of the Company, who recently held a conference with Jno. L. Senior, President of the Company, which resulted in the working out of a number of details with reference to starting the company's plant on a site already purchased near Glendale, on the Signal Mountain car line, only a few miles from Chattanooga.

It is thought by those interested that the building materials and labor have about reached the low water mark. It is also the desire of the officers of the company to be able to get into the 1922 cement market, as all indications point to an unusual cement market for the next ten or fifteen years.

John L. Senior, President of the Signal Mountain Portland Cement Company, is now president of the Peninsular Portland Cement Company, Cement City, Mich., and is a director of the Trinity Portland Cement Company of Dallas, Texas, and is interested in other large cement companies. He is a man of considerable experience in cement production.

These connections together with others, such as his being a member of the Board of Trustees of Cornell University, Ithaca, N. Y., are evidences that he is capable of heading the local organization.

It is expected that after October 1, either Mr. Senior or his representative will be on the ground continuously, and within a year Mr. Senior expects to make Chattanooga his home.

Mr. Senior has investigated within the last three years several locations for a cement plant in different parts of the country, and his associating himself with this company is proof that the Chattanooga location is superior from every standpoint.

Mr. Law stated that plans have not been completed and so no announcement of the size of the plant to be built or the cost can be made. The plant, however, is to be of the most modern design with a large capacity.

The Cement Mill at Monolith, Kern County, California, was built by the City of Los Angeles for the sole purpose of manufacturing a high grade Portland Cement for use in the construction of the City's Aqueduct from Owen's Valley to Los Angeles. No expense was spared in the construction of this plant.

The United States Potash Company was organized for the purpose of converting this Cement Mill into one manufacturing Potash, but before progressing very far on this plan, the Potash market became so demoralized that the efforts of this Company were diverted towards improving this plant solely for the purpose of manufacturing standard Portland Cement of highest quality, as well as the now well-known Monolith Water-proof Plastic Portland Cement, which is conceded to be one of the most important developments in the Cement industry for the last twenty-five years.

"In order to emphasize the fact that we, the present owners, are now solely concentrating on the production of Portland Cement, we have decided to change the name from "United States Potash Company," to that of "Monolith Portland Cement Company" and of this change we hereby advise all our friends.

"There has been and will be no change in the officers or management, writes Fred A. Ballin, president."

Mt. Pleaesant and Isabella county, Michigan, are to have a new industry. This announcement is authorized by representatives of the National Portland Cement company, a $2,000,000 corporation says the Grand Rapids, Herald. The company has purchased from the Robins Portlond Cement Holding company 236 acres of land bordering on Coldwater Lake and has under option 160 acres adjacent.

The plant will be located at Coldwater lake and the general offices at Mt. Pleasant, Mich. It is proposed to build a railroad from this city to the company's plant and extend the road to connect with the Pere Marquette west. A modern plant with an initial capacity of 540,000 barrels of Portland cement a year will be built. It is announced that the company hopes to commence the construction of the first unit in December and have the plant in operation by April, 1922. An additional unit will be added as soon as possible increasing the annual output to 810,000 barrels.

The company will employ 60 men when running full capacity. H. C. Shields, M. E. Detroit, formerly connected with the Wolverine Portland Cement Co., member American Society of Mechanical Engineers, is vice-president and general manager. Thomas L. Dates, Detroit, member Canadian Society Civil Engineers, formerly secretary-treasurer, and purchasing agent, Union Cement Co., Ltd. Owen Sound, Ont., Canada, will be the works manager. These men have been engaged in the cement industry for over 20 years.

A factory suprintendent from one of the largest cement plants in Michigan has been secured. This is the only cemcnt company in Michigan which will not have to transport its raw material, as large quantities of both marl and clay will be at the doors of the plant.

Charging the ruination of floors and furniture and the blighting of trees, shrubs and lawns by clouds of cement dust, citizens of East Chicago and Indiana Harbor have begun suit in the Lake county Superior court to recover damages from the Universal Portland Cement company.

It is alleged that the company's plant at Buffington, Ind. is the source of the cement dust, which is blown about by winds, and the plant is branded a nuisance by W. J. Murray, who demands its abatement, in addition to judgment for damages.

News of the Concrete Products Factories

"After years of successful operation of a Concrete Products Plant," writes Wm. De Lhorbe & Co., Oregon, Ill., we have experienced in the last six months, the dullest time in its history in the sale of blocks, brick, stave silos and burial vaults. During this time the sale of our Unit System Septic Tanks has increased beyond all expectations. We are shipping them out in single shipments, and car lots, and we are four weeks behind our orders. We sell to the plumbing trade and plumbing jobbers and in some localities we have agents selling directly to the farmer and the village house-holder.

"Every family who is not situated on a sewer is a prospective customer.

"The profitable shipping distance is a radius of about two hundred miles from our plant, and we have decided to offer for sale to other concrete products plants the forms to manufacture Unit System Septic Tanks.

"The limitations of this new business are boundless. A sewing machine agent considers two or three sales a week good business, but one of our salesmen sold eighteen installations of our septic tanks three weeks ago last Saturday, in the little village of Erie, Ill., with practically the same profit for each installation as is made on the sale of a sewing machine.

"You have little or no competition in your territory. Septic tanks are sold every month in the year. Our customers are community high schools, public schools, offices, stores, churches, hotels, dwelling houses, industrial plants, etc.

"Business is good with us. Let us pass these conditions on to you. Write us today for full particulars."

The South Dakota Concrete Products Co., Hugh H. Johnston, Mgr., Watertown, S. D., have completed their new factory and are turning out reinforced concrete culvert pipe for highway and sewer uses, operate Dunn molds and use American Steel and Wire Co. steel wire mesh reinforcing. The company have a large number of contracts with the state of South Dakota. Will also manufacture reinforced concrete guard rail for highway uses. Want prices and catalogs on white cement and waterproofing compound. The main office of this company is at Elk River, Minn.

Because of the great amount of interest manifested in their hollow building tile and its method of manufacture in eastern states, the W. E. Dunn Mfg. Co., Holland, Mich., have considered it advisable to open an eastern office. Mr. Glendon M. Fisher will represent them in the capacity of eastern manager and will locate his office in the Widener Bldg., Philadelphia, Pa. The Dunn Co. are more than gratified with the business outlook, especially in the east and are confident that the resulting volume of business will more than justify the opening of their eastern office.

Recommendations for permanent concrete incinerators for the disposal of paper and waste material in Galveston, Texas, in accordance with the ordinance recently enacted by the board of city commissioners permitting the burning of paper and like accumulation on private premises, were made by W. B. Evers, city fire marshal. However, in his recommendations Mr. Evers laid particular stress in the elimination of fire hazards, declaring that fire hazards exist on every hand, making the fire loss per capita $3 a year in the United States, as against a per capita fire loss in continental Europe of less than 50c.

To this end, while giving hearty indorsement to the auxiliary incinerator in private homes, he urges that all care and precaution be taken. Mr. Evers is in favor of the wire incinerator advocated by the Women's Health Protective Association, a campaign in the interest of which will be launched soon by the women's organization, but is more in favor of the concrete incinerator, which can be made a permanent part of the home.

Mr. Evers cited the incinerator on the premises of H. W. Hildebrand, 2916 Avenue O, which he considers the safest and most modern type of incinerator.

According to Mr. Hildebrand, the incinerator has been erected in his yard for ten years, since which time it has been in constant use. It is built of reinforced concrete, two feet square at the bottom and fifty-four inches high, with an outlet on the top four inches high, with wire covering to prevent sparks from escaping. It also has a door.

Mr. Hildebrand declares that everything but tin cans can be burned in this incinerator, necessitating a call from the garbage man but once in two weeks. Flies are entirely eliminated from his premises, he said. There are no roaches, no mice and no rats. There is nothing that goes to waste and nothing encouraged to harbor on the premises, the owner declared.

Mr. Hildebrand said that he built his own incinerator, the materials approximating about $2.50. However, he thinks that any contractor could place these incinerators on the market at an approximate cost of $10 each.

Mrs. John Archer Davis, president of the Women's Health Protective Association, and Mrs. Abe Blum, a member of the sanitation committee of the organization, conferred with Mr. Evers, the fire marshal, relative to the installation of the incinerators and the inauguration of the campaign.—[Galveston, Texas, News.]

At present one of the lucrative fields of the business of the Shope Brick Co., Portland, Oregon, is the sale of machines and territorial rights. Under the Shope process a plant may be established at almost any point convenient to sand and gravel. The process gives an unlimited field in coloring, from snow white to any shade or tint of the colors. Basic patents cover this process. A number of Shope plants are established throughout the country furnishing, as does the plant in Portland, material for all classes of buildings, porch trimmings, fire places, veneer work and solid brick houses and business blocks.

The government report on the Shope product is that the brick are waterproof on face up to forty feet, hydrostatic head, and in a wall, if away from absorption, discoloration is absent. Mortar used in laying the brick is waterproofed by adding cement to lime mortar.

The Shope process and machines make it possible to make any size of brick to meet certain requirements in specifications where a peculiar size or shape of product is desired.

THE LATEST DU PONT ACHIEVEMENT— LOW FREEZING STRAIGHT DYNAMITE

DU PONT Straight Nitroglycerin Dynamite has always been considered the standard of explosives. It is an extremely dependable dynamite, quick acting, sure firing, with great shattering power.

However, there was one characteristic of Straight Dynamites which made their use for certain types of work impractical: they all froze at a temperature of 45 to 50 degrees Fahrenheit, and had to be thawed to obtain maximum explosive power. Because of the sensitiveness of "straight," the thawing operation was dangerous.

Manufacturers of explosives have tried for years to eliminate the thawing hazard—which has detracted from the efficiency of Straight Dynamite—without at the same time losing its fine qualities.

This is just what Du Pont Chemical Engineers have accomplished after years of experiments in the laboratories and in the field.

Du Pont Straight Dynamite is now practically non-freezing and requires no thawing. Operations in the field have been successfully carried on with this explosive at ten degrees below zero. It is now possible to "shoot" straight dynamite successfully under weather conditions which formerly would have made its use impractical.

This marked advance in the art of explosives manufacture illustrates one feature of Du Pont Explosives Service—constant improvement in the efficiency of the product. Painstaking chemical control in manufacture insuring uniform quality, a remarkable distributing system insuring prompt delivery, a staff of field experts always at your command, combine to form a service which constantly meets and anticipates the needs of Industry.

Put your explosives problems up to Du Pont

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KENT CONTINUOUS MIXER
for CONCRETE PRODUCTS PLANTS

Is your plant equipped with modern machinery that saves labor, holds down your pay roll, and turns out large quantities of QUALITY products at a low cost? You have not the proper equipment if you are mixing concrete with a machine designed in fact for another trade.

The Kent is especially designed for the needs of concrete products plants. It is low in cost, continuous in action, easy to keep in repair and it has a good clean record of 15 years in the industry.

Write today for Catalog No. 8

THE KENT MACHINE CO.
KENT, OHIO

A BIG DEMAND FOR THESE VAULTS
—PROFITS LARGE—

With our Adjustable Steel Molds you can easily make any size of the Automatic Sealing Burial Vault at an exceedingly low total cost.

When once they are seen and used in a community the Automatic Sealing Burial Vaults come into instant demand. They are far superior in every way to any other cement or steel vaults.

The manufacturing of these Automatic Sealing Burial Vaults with our Adjustable Steel Molds is a big money making opportunity. The first ten vaults you sell will more than pay back your entire investment—materials, molds, time, etc., etc.

Write us for complete particulars.

Automatic Sealing Vault Co.
216 E. River St. PERU, IND.

Concrete Blocks, Bricks Building Trim, Posts, Ornamental Work, Etc.
WHEN FACED WITH
Mica Spar Crystals

IS CHANGED INTO
SPARKLING GRANITE
Beautiful, Artistic and Everlasting

Made in six scientifically milled sizes, extremely hard, sharp and free from dust. Insures strength and beauty. Booklet "Micaspar and How to Use It," with free samples mailed on request.

Crown Point Spar Company, Inc.
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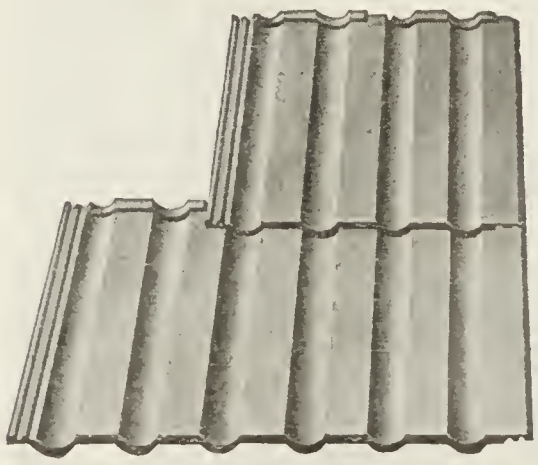
THE UNITED STATES CHAMPION CONCRETE ROOF TILES



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Is a perfect and durable roofing. They firmly interlock and overlap one another in both ends and sides of the tile. A peculiar feature of our tiles only. They are carefully designed in a variety so complete that any roof can be finished beautifully with them. No matter how complicated it is.

For nearly 30 years our tile machinery has been in successful use. Its simplicity, lasting quality and unequaled capacity have created a very great demand for it everywhere when introduced.

Buy the U. S. Champion Tile Machines for making French and Spanish Tile. Their moderate price and superiority to any others will justify your purchase of them. Write us for description and prices.

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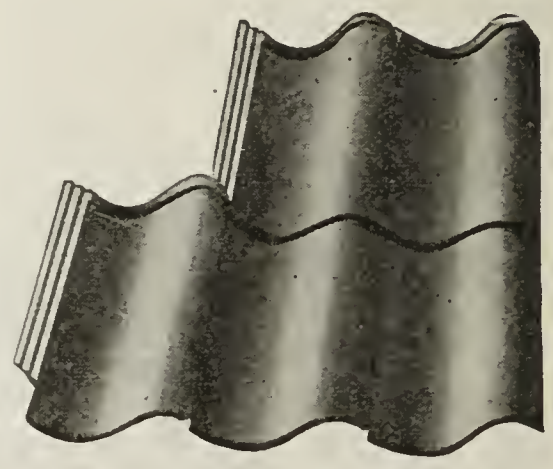
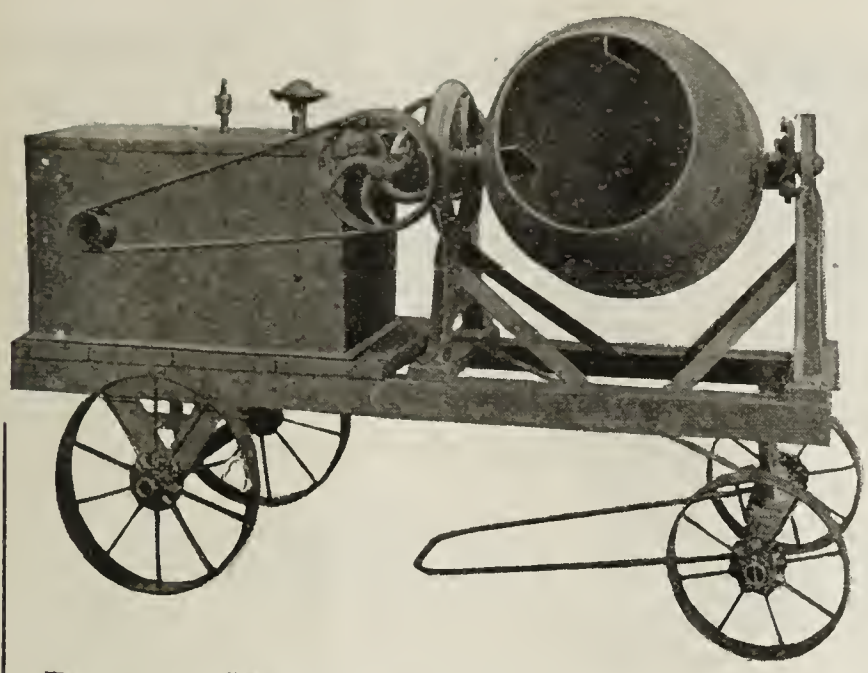


SPANISH TILE



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REMMEL MIXRITE Concrete Mixer

The World's Best 4 Cubic Foot Mixer

All Iron and Steel construction, with the EXCLUSIVE SIDE GEAR DRIVE, that adds 100% to its worth. Mixer loads or discharges from either side—always in gear when dumping. Strongly built—no wobbling.

The Popular Mixer for

MASON CONTRACTORS
Saves 50% in Labor

CONCRETE CONTRACTORS
Large enough for the average job and small enough to be readily moved. A Money Saver.

CARPENTER CONTRACTORS
Just the right size for foundations and floors.

TOWNSHIPS
Just right for culvert and county work.

Sold Under Iron-Clad Guarantee. Write for complete specifications and descriptive circulars. Dealers wanted everywhere.

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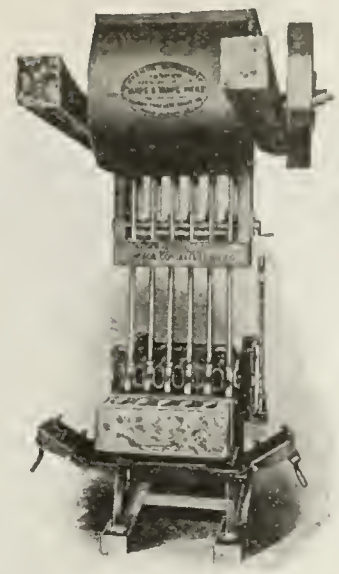

THE HOBBS

The multiple oval cores of a Hobbs machine make the use of wet mix possible with no loss of time. The result is a hard, dense, waterproof block—plain for foundations and cover walls—faced for superstructure.

For Catalogs and Prices, write

The Anchor Concrete Machinery Co.
Home Office: Rock Rapids, Iowa
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Makes 5,760 building blocks a day

The Debay Completely Automatic Block Machine is a piece of equipment that can turn a struggling block plant into a prosperous manufacturing enterprise.

It is the only concrete block molding machine in the world that has rotating mold members with stationary core bars.

Hand labor is reduced to the minimum.

Keep the material hopper full and the finished 8x8x16″ blocks flow from the machine on an endless belt in an endless stream at the rate of 12 every minute, 720 an hour, 5,760 a day.

The product includes standard 8 x 8 x 16″ back-up, corner and end blocks in a wide variety of faces.

See it in the movies!

You can see the machine operating in a plant at Springdale, Pa., or we will show moving pictures of its operation in any community where interest is manifested in the proposition.

Write for details.

Debay Research & Mfg. Co., Springdale, Pa.

THE POLK SYSTEM

All-Steel Machines for All Kinds of

Circular Concrete Construction

We contract grain storages.

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210 to 214 South Fourth Street, ST. LOUIS, MO.

We make a specialty of supplying cement works with

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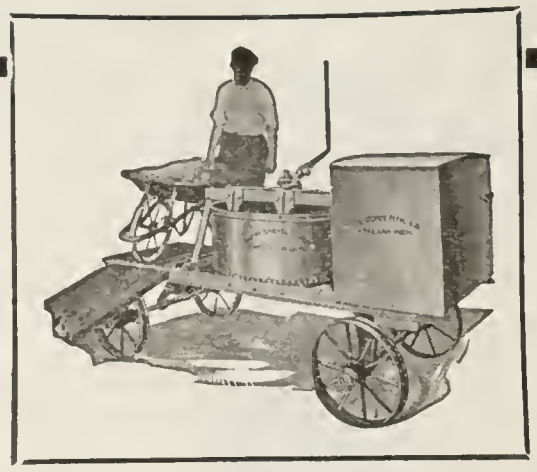
High Grade Goods Only

Satisfaction Guaranteed



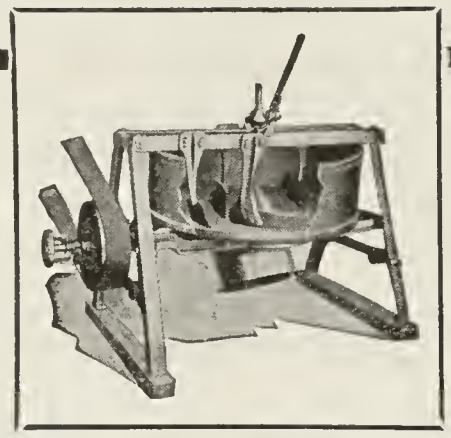
An all-round mixer for all-the-year-round work. Use it on all your concrete, mortar and plaster mixing jobs.

CONTRACTORS USE THIS MIXER ON THREE TIMES AS MANY JOBS

Portable Dunn Shovel Mixers are designed to mix mortar and plaster as well as concrete. They are built to do this work better than you ever had it done before. We want you to expect more service from it than from any other mixer. Don't be afraid of overworking it; keep it busy day after day on all of your mixing jobs. Even if you give it three times as much work to do as you would an ordinary mixer, it won't wear out any sooner.

You'll like the ease by which this mixer is charged, its rapid and convenient bottom discharge, the way it cleans itself, its compactness, portability, sturdiness and dependability. Because it will mix concrete, mortar and plaster and because of its many features, you really get three mixers for the price of one. And you pay no more for it than for an ordinary mixer. Try it out for a couple of weeks before you buy.

Ask Us to Send You Bulletin T-20



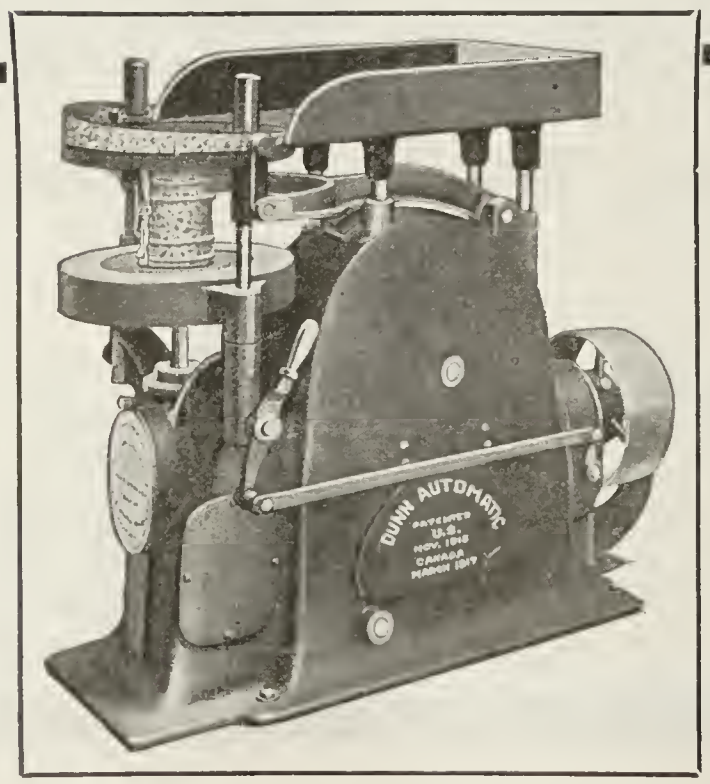
The Dunn Shovel Mixer produces a thoroughly mixed, plastic material because of its four shovels. A hundred times a minute the material is shoveled, stirred and troweled.

It not only saves the labor of one man, but it improves the quality of your products and increases your production. You may try it out before buying.

RUN YOUR PRODUCTS PLANT WITH ONE MAN LESS

With a stationary Dunn Shovel Mixer properly installed you can improve the quality of your products and increase your production with one man less than you are now employing. Simply because power and gravity are utilized to accomplish automatically what you are now doing by hand. The only labor involved in keeping your production machines, whatever they might be, constantly supplied with material is in loading a bucket below the floor level with the unmixed materials.

You'll be interested in knowing that the cost of this complete mixing and conveying equipment is less than that of the ordinary conveyor alone.



Write for Bulletin M-21

THE BUSINESS OF MAKING HOLLOW TILE

The immense demand and market for a more economical, more permanent building unit, such as hollow concrete tile, is readily evident in every community. Supplying this market means a permanent business bringing in large earnings.

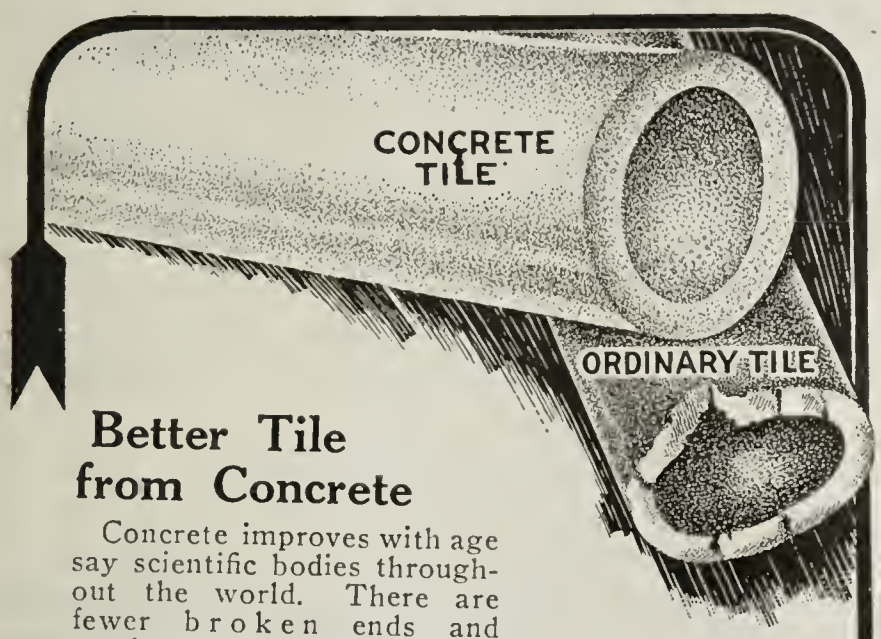
It is a big part of our business to completely equip standardized plants for turning out this hollow tile and other products in large quantities at low cost. That we are able to establish you in a most profitable business is demonstrated by the success enjoyed by all Dunn Plant owners.

There's a whole lot to be said about this proposition which will interest you. Drop us a line for particulars.

W. E. DUNN MFG. CO.

414 W. 24th Street

HOLLAND, MICHIGAN



Better Tile from Concrete

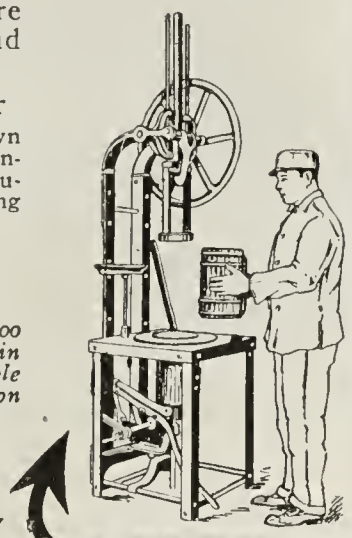
Concrete improves with age say scientific bodies throughout the world. There are fewer broken ends and cracked tiles, when they are made from concrete. They lay up closer, and make a better job, because they are more uniform in shape and size.

Tamping Method Superior

The Bureau of Standard has shown that the tamping method, that principle employed in the Cardiff, is superior to the rotary or pressing method of moulding.

Cardiff Cement Tile Machine

will make its owner from $50 to $100 per week. Cement tile, moulded in a Cardiff Machine make a profitable side line for anyone in a position to follow it.



Write for full description and proofs.

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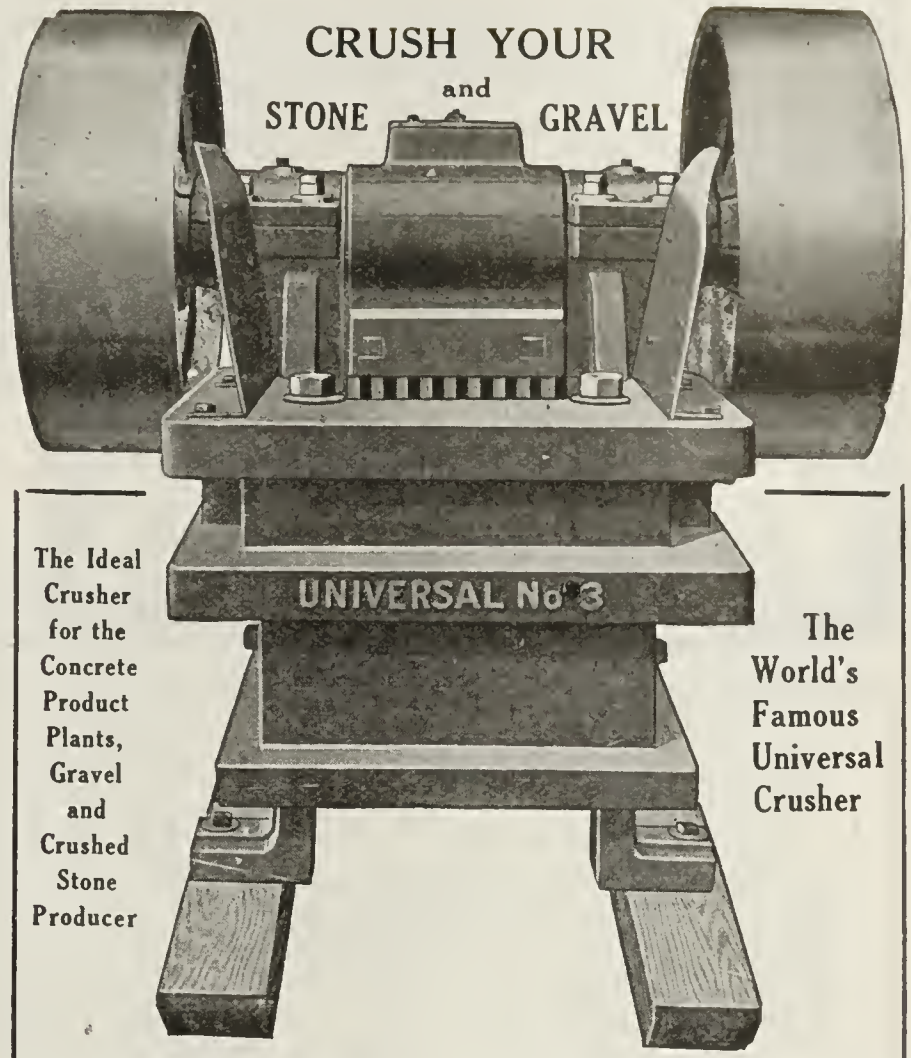

The Ideal Crusher for the Concrete Product Plants, Gravel and Crushed Stone Producer

The World's Famous Universal Crusher

We Build Crushers from 5 Tons to 300 Tons per 10-hour Capacity

Instantly adjusted to produce size required from ¼ inch to 3 inches. *Write for Folder No.* 14.

UNIVERSAL CRUSHER COMPANY

230 Bee Ave. Cedar Rapids, Iowa, U. S. A.

Big Profits Making Septic Tanks

BENEFIT BY OUR EXPERIENCE

After years of successful operation of a Concrete Products Plant, we have experienced in the last six months, the dullest time in its history in the sale of blocks, brick, stave silos and burial vaults. During this time the sale of our Unit System Septic Tanks has increased beyond all expectations. We are shipping them out in single shipments, and car lots, and we are four weeks behind our orders. We sell to the plumbing trade and plumbing jobbers and in some localities we have agents selling directly to the farmer and the villaage house-holder.

Every family who is not situated on a sewer is a prospective customer.

The profitable shipping distance is a radius of about two hundred miles from our plant, and we have decided to offer for sale to other concrete products plants the forms to manufacture Unit System Septic Tanks.

The limitations of this new business are boundless. A sewing machine agent considers two or three sales a week good business, but one of our salesmen sold eighteen installations of our septic tanks three weeks ago last Saturday, in the little village of Erie, Ill., with practically the same profit for each installation as is made on the sale of a sewing machine.

You have little or no competition in your territory. Septic tanks are sold every month in the year. Our customers are community high schools, public schools, offices, stores, churches, hotels, dwelling houses, industrial plants, etc.

Business is good with us. Let us pass these conditions on to you.

For Full Particulars Write

WM. DE LHORBE **Oregon, Ills.**

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"V-B" Balata
"AMPERE"
(Canvas Stitched)
GRIP-ON
(Impregnated Solid Woven)

Write for Prices, Discounts and Samples
VICTOR BALATA & TEXTILE BELTING CO.
Factory: Easton, Pa. Main Office: 38 Murry St., New York
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CONVEYOR BELTS A SPECIALTY

WATER

WE-FU-GO AND SCAIFE
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES
WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

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Waterproofing Paste
CONCENTRATED

Truscon Waterproofing Paste Concentrated provides certainty of results and economy in costs. Certainty because it has proved itself. Used in many thousands of buildings and it has always given perfect results. Economy because it is the only concentrated waterproofing material on the market. It contains absolutely no fillers—every particle possessing maximum waterproofing value. This provides the lowest cost per cubic yard.

Learn about Truscon Waterproofing Paste Concentrated by receiving Structural Waterproofing. This handsomely illustrated volume, 8½x11 inches, will be sent free on request written on business stationery.

The Truscon Laboratories

Manufacturers and Inventors of
Waterproofings, Dampproofings,
Technical Paints, Floor Hardeners

DETROIT MICHIGAN

Hollow Walls and Solid Walls

These Forms build either kind. The Forms will owe you nothing after you have built the one job. They are so Cheap. They are strong and dependable forms and the lightest forms built. Don't break your back lifting forms from the wall. Let us prove these statements.

Send for our catalog

THOMPSON FORM & CLAMP CO.
Fond du Lac, Box 166 Wisconsin

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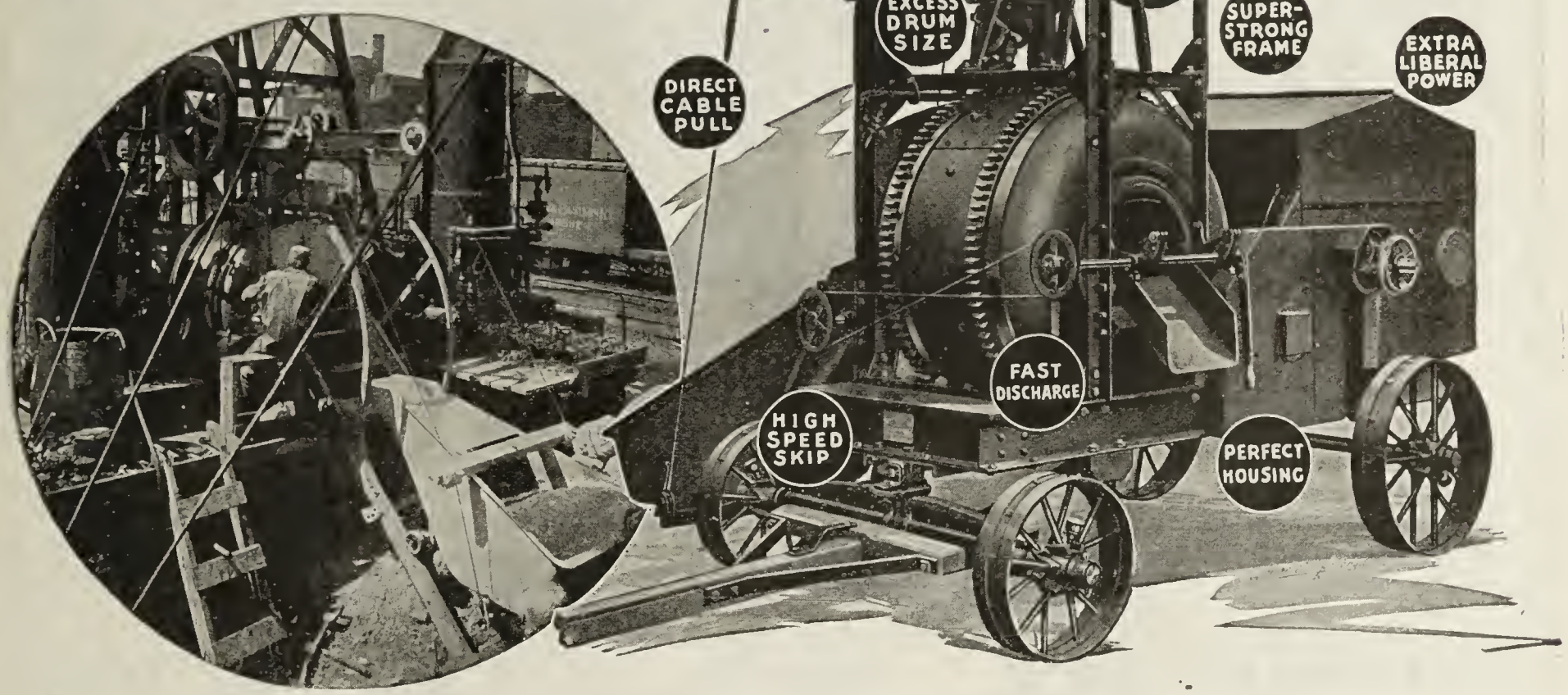
UNEXCELLED FOR
Facing Concrete Blocks, Ornamental Concrete Stone, Hard Plaster, Finishing, Exterior Plastering, Roofing, Stone and Marble Sawing, etc.

Prices, Freight Rates and Samples on Application
Shipped in Paper Lined Box Cars
Small Shipments in 175-lb. Bags

Ottawa Silica Company
OTTAWA, ILLINOIS

KOEHRING

HEAVY DUTY MIXER



THE **surest-profit** factor you can bring on a job—mixer dependability in the form of Koehring heavy duty construction.

Koehring-mixed concrete is **Dominant Strength** concrete, so established by official tests whereby Koehring mixed concrete has been proved to be as much as 31% stronger than concrete mixed by other mixers.

Due to the Koehring **re-mixing** action Koehring-mixed concrete is uniform in distribution of aggregate to the last shovelful of every batch.

Write for Koehring catalog No. B-5—a book that shows in detail Koehring heavy duty construction—shows you how to judge mixer value.

Koehring Capacities

in cu. ft. wet batch rating

Pavers 10, 14, 21 and 28 cubic feet mixed concrete, with or without loading derrick.

Construction Mixers, 7, 10, 14, 21, 28 cu. ft.

Hot Mixers for bituminous work, 9, 14 cu. ft. side charging type; 18 cu. ft. paver type.

Gasoline, Steam and Electric Power.

DANDIE LIGHT MIXER

Koehring Dandie Light Mixer—4 and 7 cu. ft. capacity, wet batch rating—a light mixer that brings dependability into the light mixer field—at a price that makes it the remarkable value of the industry. The reasonable investment mixer for miscellaneous work on big contracts, for footings, culverts, silos, etc., or for all general work within capacities. No. 104-S, gasoline, No. 107-S, steam and gasoline—may be equipped with standard or batch hopper, low charging platform, or power charging skip, automatic water-measuring tank or light duty hoist. Write for catalog B-45.

KOEHRING MACHINE CO., Milwaukee, Wis.

Sales and Service Offices and Warehouses in all parts of U. S.

These Booklets Are Easy to Read and Worth Reading

Pamphlet No. 15
gives details of the various types of dragline cableway excavator installations suitable for general dirt-moving operations, brick and tile plants, and so forth.

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is a handy compilation of data on the dragline cableway excavator method of excavating and conveying sand and gravel, illustrated with many views of typical installations.

Pamphlet No. 12
describes the latest developments in the use of mechanical drag scrapers for handling gravel from hillside, and explains the adaptability of power scrapers for small pits.

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illustrates practical solutions of various storage problems by use of scrapers and dragline cableways, some of this information being now published for the first time.

Which of the above pamphlets do you want? Send in your request at once.

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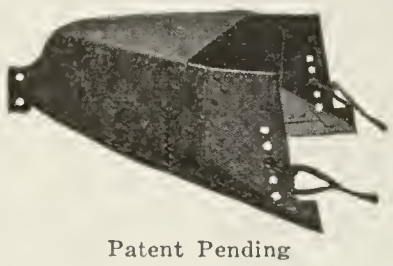

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Our Late Development of

POWER DRAG SCRAPER

Is proving its worth

We will shortly be prepared to mail you CONCRETE INFORMATION including photographs and drawings of just what it is doing for others during the present year. This information will be especially valuable at this time when you should be familiar with the most economical methods of excavating.

L. P. GREEN
907 Lumber Exchange Bldg.,
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Extraordinary Announcement:

The Breakers

ATLANTIC CITY, N. J.

ON THE OCEAN FRONT FIREPROOF

Remarkable Reduction in Rates

From September 19th, 1921

European Plan	American Plan
$2.50 up daily, Single	$42 up weekly, Single
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Fireproof Garage on Premises

New Golf Club Privileges

Building Material of Beauty

Minimum absorption, maximum strength, light and easy to lay and produced in style, shape and design to meet any architectural requirements.

INEXPENSIVE **PERMANENT** **POPULAR**

Under one operation the stone are veneered with granite, marble or other natural products and sprayed as they come from the machine, producing a Reconstructed Stone in natures own beauty.

AN OPPORTUNITY

If you are interested in producing a high class building unit of standardized dimension, and desire to invest in a Real Manufacturing Business, WRITE US NOW.

HYDRAULIC RAMMING CONCRETE STONE MACHINERY

LITTLE FALLS **NEW JERSEY**

THE HELM PRESS

has contributed to the building industry the greatest advance toward a perfect, permanent brick and block. Every part of it has culminated from mature experience and is based on sound engineering principles. The Helm press is always built upon the basis of ultimate satisfaction to the user. No pains are spared to use the best materials obtainable and the best workmanship in putting them together.

That is why hundreds of satisfied users employ the Helm press to make their bricks and blocks and why a large percentage of our business is repeat orders.

Helm supplies everything necessary for the complete concrete brick and block factory—plans and installs it—then stands solely responsible for its satisfactory operations. If you are considering installing a new brick or block plant, or changing your present equipment, you are invited to write us—it obligates you not at all and you can't go wrong.

THE PRESS THAT MAKES THE MONEY

THE HELM BRICK MACHINE CO.

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REICHERT Adjustable Steel Molds

Improved locking device, saves time. Tight, accurate fit at joints produce smooth finish.

They help you land contracts
You can bid lower, at no loss of profit. Reichert Forms are standardized—units interchangeable. Ask for catalog.

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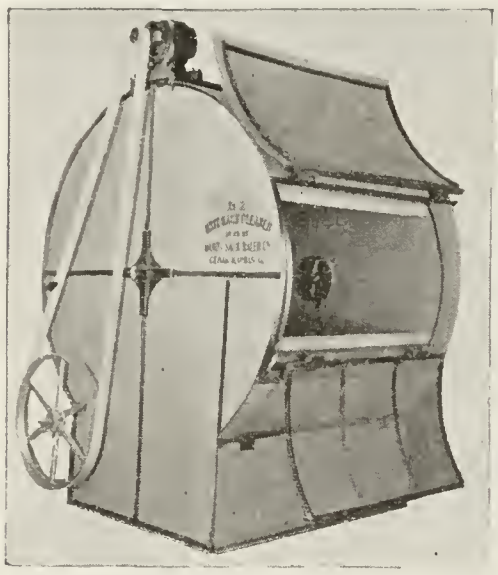

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Salvage from 5 to 10 sacks of good cement from each 1,000 empty sacks and reduce labor by one-half—by cleaning them in our

Unit Sack Cleaner

Write us for particulars.

Handy Sack Baler Co.
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STIMULATE YOUR BUSINESS

Now is the time to get going. We can help you devise an economical selling plan,—direct by mail—to develop orders and inquiries.

What you need to get the business will be carefully determined by an analysis and you will be given sound advice by an able staff of counselors.

Selling Campaigns Planned, Printed; Guaranteed Mailing Lists Compiled; Addressing and Mailing; Form Letters.

Send for your *free* copy of Direct Advertising List Book.

BUCKLEY DEMENT & CO.
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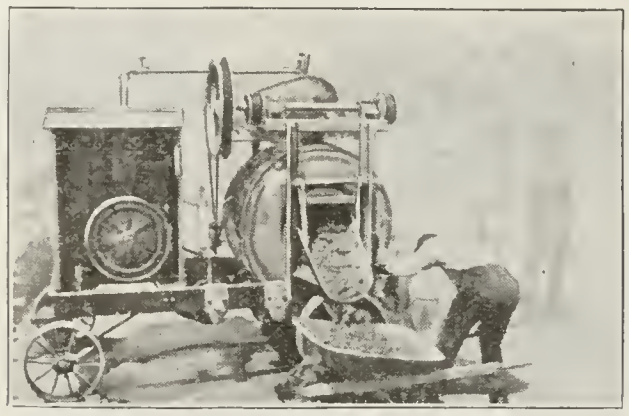
This New Building, Erected, Occupied and Owned by Buckley, Dement & Co., Direct Mail Specialists.

Our Highly Organized Methods and Equipment Are an Asset for Any Advertiser.



THE *Atlas* MIXER

Represents the best established practice in Concrete Mixer Construction.

Its dependability and simplicity commends it to the contractor who appreciates the importance of uninterrupted service.

The Atlas is made in various sizes and styles. Let us mail you our catalogue.

Send for it today—NOW

ATLAS ENGINEERING CO.
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P. S.—If you are interested in material handling equipment, let us mail you our ATLAS Wagon Loader, Box Car Loader, Car Unloader, Belt and Bucket Conveyor and Portable Storage Bin catalogue. The catalogue is yours, simply ask for it.

Conco Cars

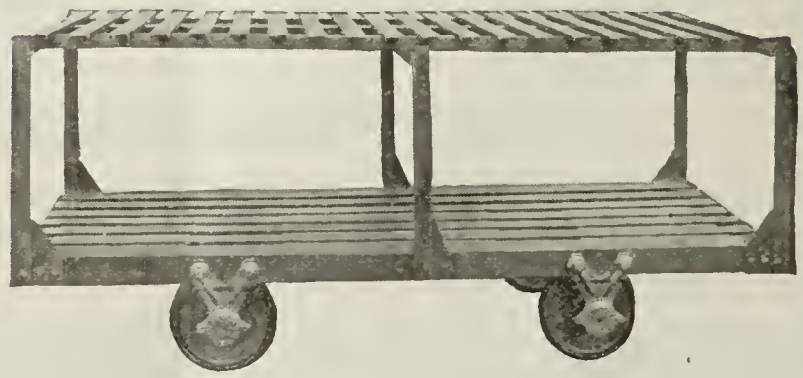
are fast becoming the popular car among tile and block makers because of their durability, convenience in loading, light weight and moderate price.

Let us solve your hauling problems.

H. D. CONKEY & CO.

Mendota, Ill.

Pulleys—Gears—Hoists
Hyatt Roller Bearings in Stock



for facing concrete work

FOR the stucco suburban home—the modern public utility plant and factory—the bank and office building—first call is for Middlebury Terrazzo for facing concrete work.

Middlebury Terrazzo has all the appearance of solid marble—with all its advantages and at a material saving in price.

Made from Middlebury White and Crême Statuary Marbles, it is furnished, carefully graded to size, in either dust, No. 1, 2 or 3.

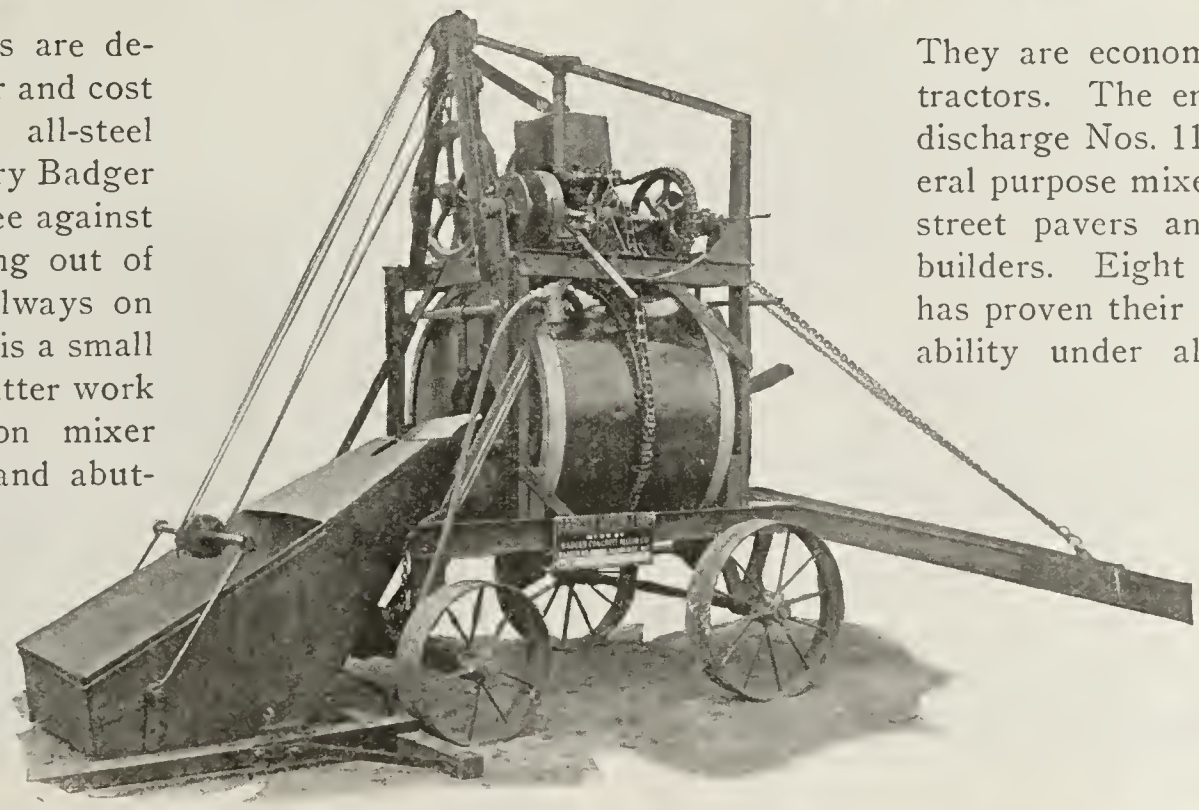
Send today for free samples and prices

Middlebury Marble Company

BRANDON, VERMONT

BADGER MIXERS

The Badger Mixers are designed to save labor and cost of operation. The all-steel construction of every Badger Mixer is a guarantee against breakage or wearing out of parts. They are always on the job, whether it is a small mixer on curb or gutter work or the construction mixer upon foundations and abutments or the alley and street paver. Their light weight and durability has made a distinctive reputation for the Badger Mixer.



They are economical to the contractors. The end load and end discharge Nos. 11 and 15 are general purpose mixers and alley and street pavers and country road builders. Eight years of service has proven their absolute dependability under all conditions of concrete work.

Write for our attractive prices.

The ~ Badger ~ Mixer Line

BADGER CONCRETE MIXER CO., 13th Floor MAJESTIC BLDG. **MILWAUKEE, WIS.**

FABRICATED STEEL PRODUCTS

We specialize on FABRICATED STEEL PRODUCTS and are equipped to furnish steel plate products such as Tanks, Hoppers, Stacks, Conveyors, Chutes, Pipe, Elevator Legs, Coal Mine Equipment, Cement and Concrete Sheet Steel Forms promptly. Let us estimate on your requirements.

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We are specialists in furnishing and erecting ROOFING and SIDING of Galvanized, Painted or Zinc sheets, corrugated or formed. Our mechanics are experts—they know how. Let us figure on your erection, no matter where located.

Our complete stock of Galvanized, Black, Blue Annealed Sheet Steel and Zinc enable us to give immediate attention to all orders and inquiries received

THE SYKES COMPANY

930 West 19th Place **CHICAGO, ILL.**

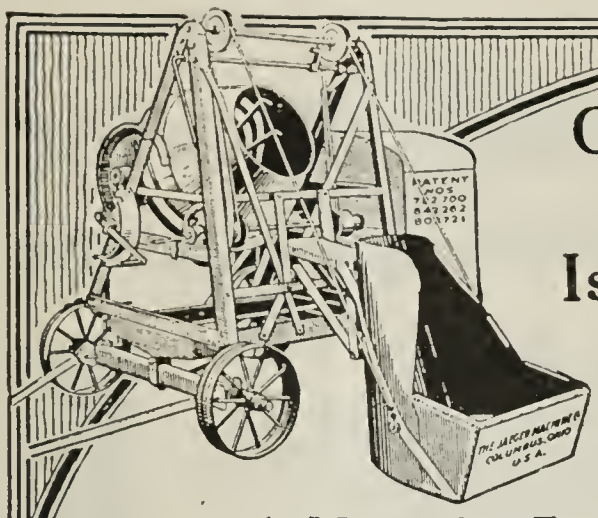
BROWNING LOCOMOTIVE CRANES

A WONDERFULLY varied usefulness has earned for the Browning Locomotive Crane the title of "All-Around Champion." The engineers who have developed it are practical crane men. They have not only made it quick and easy to operate, but with this wide range have given Browning owners the opportunity to get the largest possible profit.
Every user from the owner of an industrial plant to the general contractor can find a multitude of profitable uses for a "Browning" Crane. It can be equipped to handle a hook-block or grapple, an electric magnet, any type of bucket, or a dragline scraper. With a set of pile-driver leads it becomes a pile-driver of exceptional efficiency, or with a Browning Steam Shovel attachment you get a steam shovel of extreme reach and high dump. All are interchangeable.

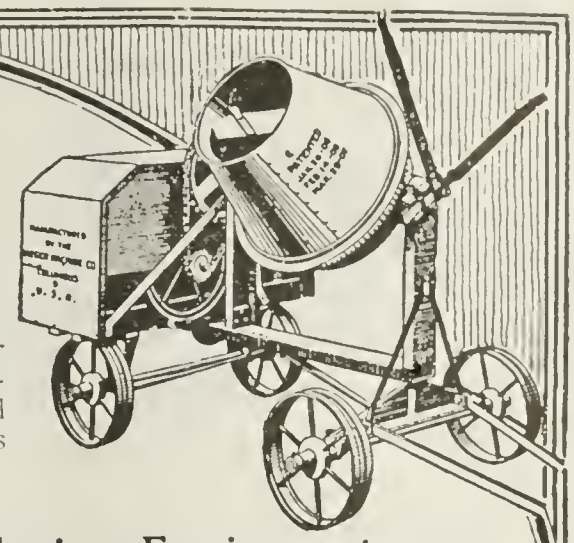
Write for Graphic Illustrations of the Adaptability of the "Browning" and Find Out How It will Cut Your Costs

The BROWNING CO. Cleveland, O.

SALES OFFICES: New York Chicago



One Thing Is Certain THE JAEGER Is a Bear for Speed



Outfitted with Jaeger mixers and Jaeger Placing Equipment you have the time-saving, labor-saving aids that cut cost and land the better jobs and the bigger profits for you.

A Mixer for Every Job

With three sizes of batch capacities—with fourteen different outfits. No matter what kind of concrete work you have, there is a Jaeger Mixer for you. Each Jaeger Mixer is famous for being efficient, economical, strong, durable, and low in first cost.

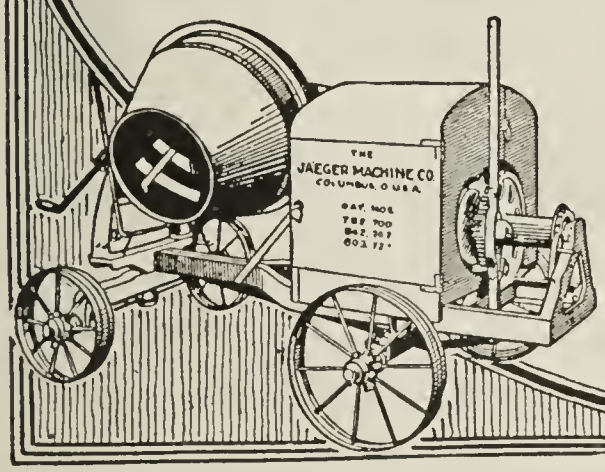
We guarantee the Jaeger Mixers to be constructed of the best material in the best mechanical manner.

Jaeger Placing Equipment

consists of the Jaeger Mixer complete with loader and hoist. Spouting outfit consists of 50 feet of track and 10 foot sections, and adjustable legs. Skip car holds one full batch of concrete and is automatic in dumping and equipped with brakes. The hoist pulls this car up to hopper where it dumps.

Full information and prices mailed on request.

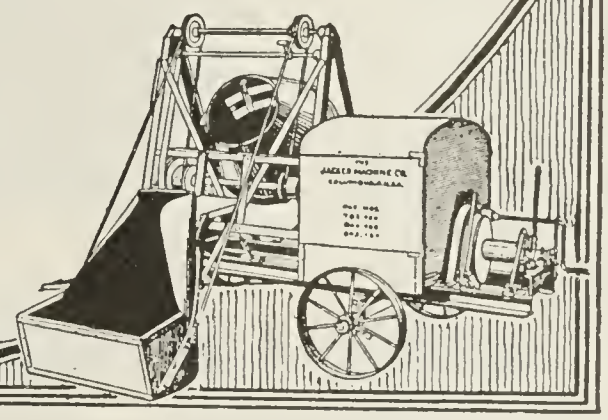
THE JAEGER MACHINE COMPANY 212 Dublin St., Columbus, Ohio



Quality

A MIX A MINUTE

Mixers



B.&B. Wire Rope

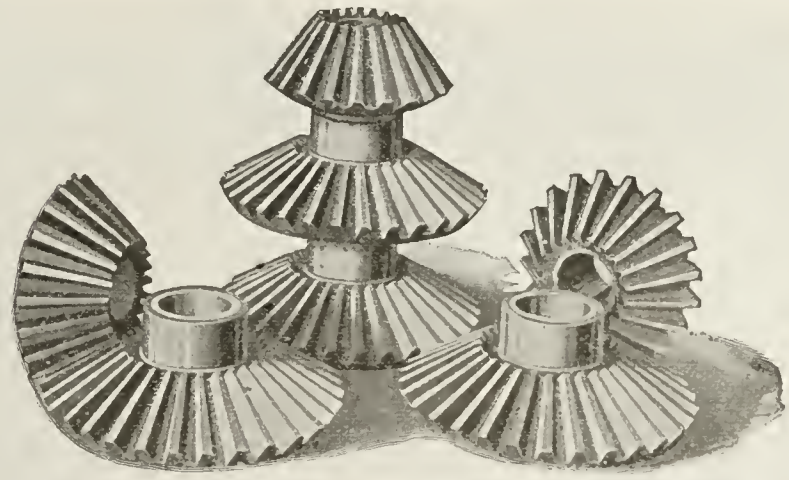
Measure B & B Wire Ropes against the requirements you demand in the best hoisting line. They're flexible, steel-strong, durable.

With those requirements successfully met, B. & B. Wire Ropes are bound to be dependable and economical. Write for Catalog 60

BRODERICK & BASCOM ROPE CO., St. Louis, Mo.

Manufacturers of Celebrated Yellow Strand and all standard grades of Wire Rope

Branches: New York and Seattle Factories: St. Louis and Seattle



Make Your Gear Service a Certainty

Ganschow Bevel Cut Gears—like Ganschow Gears of every kind—are cut with an accuracy and precision which makes smooth, easy, effective working a certainty. They minimize wear and tear and insure long life to the parts. From twenty to forty per cent less power is required to operate

Ganschow Cut Gears

as compared with cast gears, because of evenly-thick and evenly-spaced teeth, and because they are uniformly smooth. Throughout the whole machine the jar and strain are greatly reduced; and this means gear-efficiency from every standpoint.

As specialists in gear work, our splendid facilities enable us to take care of any requirement from the smallest gear up to 12 ft. in diameter—and do it QUICK. Every gear strictly according to specifications and free from defects.

How about YOUR gear requirements?

Wm. Ganschow Company, Chicago, Ill.

1003 W. Washington Street

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Steel Reinforcing Bars

Three grades: open hearth steel (new billet stock), "medium" and "hard" grade, and rail carbon steel (re-rolled). Both theory and practice agree on the design. Rounded corners prevent splitting of the concrete. Bending, fabricating and setting are easily done with these bars.

Sizes ⅜ to 1¼ inch. Lengths up to 85 feet. Shipments can be made promptly

Inland Steel Company

First National Bank Bldg. CHICAGO

WORKS:
Indiana Harbor, Ind., and Chicago Heights, Ill.

BRANCH OFFICES:
Dallas, Denver, Detroit, Los Angeles, Milwaukee, St. Louis, Kansas City, Mo., St. Paul, San Francisco, Seattle

Laclede Bars for Reinforcing Concrete

Many buyers now take advantage of facilities at mill by ordering bars cut to length, bent to shape, and tagged—ready for placing.

For Particulars Address

Laclede Steel Company

Works:
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Chicago Office:
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IMMEDIATE DELIVERY

"Franklin"

ROUND—SQUARE—FLAT—SQUARE TWISTED

STEEL BARS
for CONCRETE REINFORCING

We can meet your Reinforcing Steel Requirements. This means not only quick shipment from the mills but co-operative service for rapid transportation. If you want to know just what your exact cost will be, send us the Blue Prints and we will give you a lump sum bid on all the steel sheared to lengths, bent to specifications and delivered to the job,

Our Engineering Department is at your service.

The FRANKLIN STEEL WORKS

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Boston Office
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QUALITY SERVICE

Concrete Roads must be reinforced

It is demonstrated beyond doubt that to make concrete roads proof against heavy motor traffic, weather and time, a fabric of steel must be incorporated in the concrete.

Several great states have so ruled.

American Steel & Wire Concrete Company's Reinforcements fulfills every engineering requirement.

Send for our book on road building.

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New York
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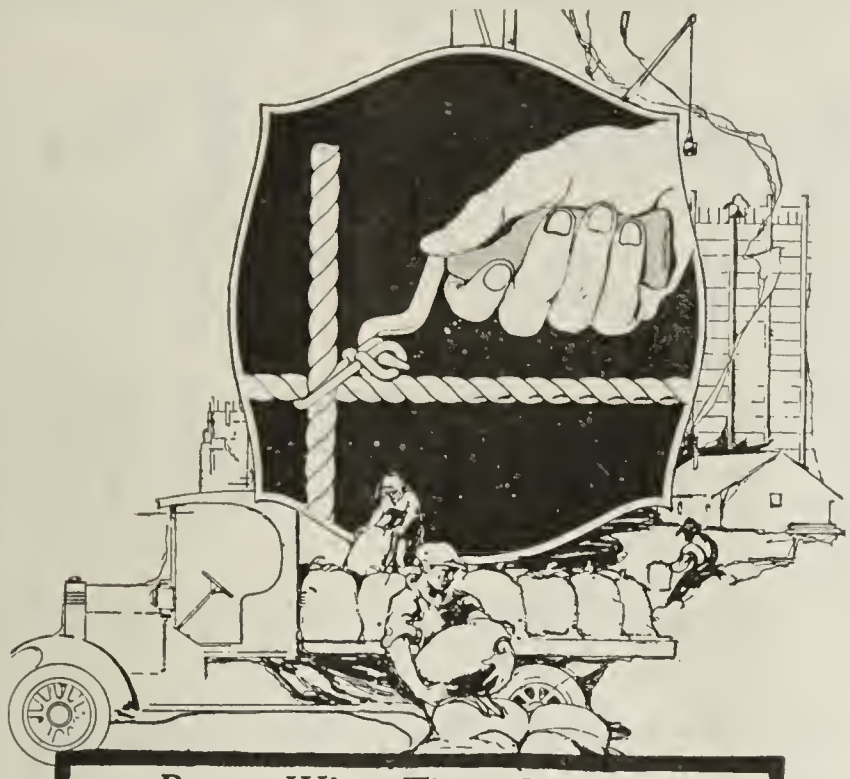


Bates Wire Ties Now Sell At Less Than Pre-War Basis

Write for the new prices on Bates Wire Ties—they cost you less than ever before—actually priced lower than during the pre-war period.

If you are using the Bates System of Tying, stock up at the new prices.

If you havn't adopted the Bates System yet—**Send for this FREE Trial Bates Rod Tying Outfit.**

The Bates FREE Trial Rod Tying Outfit containing one "Simplex" Hand Tying Tool and 20 each of 4, 5, 6 and 7-inch Bates Wire Ties, will be sent on receipt of your signed agreement to try this Rod Tying Outfit on your work, and then within fifteen days, send us $1.00 or return the tool. These trial ties cost you **NOTHING.**

BATES VALVE BAG COMPANY

7330 South Chicago Ave., Chicago, Ill.

BATES SYSTEM FOR FILLING & CLOSING BAGS

110 Great Portland St., London, W. I., England

Contractors can't afford to be without

The Waterloo Bar Bending Machine

It's made in 2 sizes, and is guaranteed to bend bars as follows: No. 2 bends cold reinforcing bars including 1⅛ in. round or square. Price $30.00. No. 3 bends cold reinforcing bars including 1¼-in. round or square. Price $35.00.

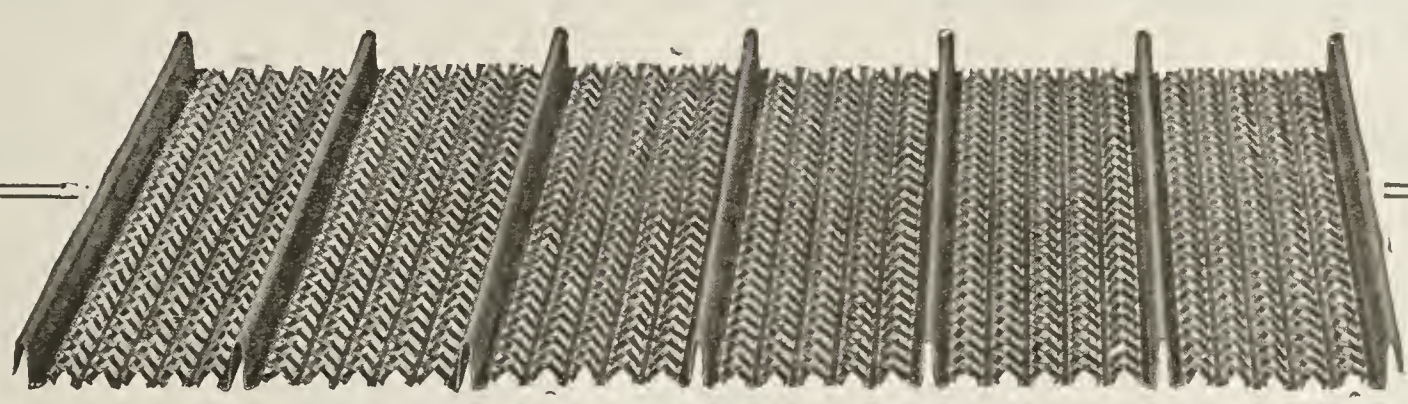
Bends bars to various angles desired. Has a detachable handle 7 feet long for convenience in handling.

Waterloo Construction Co., Waterloo, Iowa

SAVE CEMENT SACK LOSS

Bale your sacks up tight and right. Keep them baled up all the time. If you have one of our handy sack balers you will do this. We manufacture a cleaner that cleans. Write us for prices and further information.

HANDY SACK BALER CO
620 S. 2d St.
CEDAR RAPIDS IA.



15/16 IN. HY-RIB (SEVEN-RIB). Ribs 15/16 in. high, 4 in. apart; sheets 24 in. wide.

Insure Your Building Results

by using the complete line of material for use in all types of construction. Be sure of prompt delivery, as our complete stocks and large organization warrant immediate shipment.

HY-RIB and RIB LATH

the acknowledged standard material, as used everywhere in all kinds of construction work.

The many depths, gauges and types of Hy-Rib adapt it to reinforcement of concrete floors and roofs. It is an ideal plastering surface for walls and ceilings and renders the building entirely fireproof. Easily put in place and on arched and curved work it is furnished bent to the exact curve.

Our complete line includes, in addition to the above, Diamond Lath in two types; Pressed Steel Channels and Studs of all varieties; four types of Corner Beads; three types of Base Screeds, etc. Send for free Hy-Rib Hand Book.

TRUSCON STEEL COMPANY, Youngstown, Ohio

Representatives in Principal Cities

For Concrete Roads

Kahn Road Mesh
The most efficient reinforcement for concrete roads and pavements.

Kahn Curb Bars
Protect and reinforce concrete curbs.

Kahn Armor Plates
Perfectly protect expansion joints.

Write for Highway Pamphlet and estimates.

For Better Concrete, Stronger Mortar—use HYDRATED LIME

Increases Concrete Density

By virtue of its ability to fill the voids, Hydrated Lime increases the density of concrete. The mass becomes more watertight—practically impervious to water. Honeycomb and other structural weakness are also prevented. Hydrated Lime promotes intimate contact of the concrete mass with the forms and produces smooth, pleasing exterior surfaces.

Other Reasons Why You Should Specify and Use Hydrated Lime because

1. Makes the mixing of Portland cement concrete more easy, inasmuch as it lubricates the sand grains and coarse aggregates.
2. Renders the concrete mix plastic enough to flow freely and smoothly with a minimum of excess water.
3. Makes the concrete easier to work after it is deposited in the forms, thus eliminating labor usually required for spading and tamping against the forms.
4. Eliminates the tendency toward cracking, because it minimizes alternate expansion and contraction due to moisture changes.
5. Promotes uniformity of the mass concrete by producing a colloidal or jelly-like medium through which the rock and matrix do not segregate, thereby producing a stronger concrete.
6. Materially and directly increases the ultimate compressive strength and efficiency of the concrete, by virtue of its ability to hold water in mechanical suspension and thus supplying the necessary moisture required by Portland cement in order properly to set and attain its maximum strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

Ladd Lime & Stone Co., Cartersville, Ga.

Marblehead Lime Co., Chicago—Kansas City

Louisville Cement Co., Louisville, Ky.

Lee Lime Co., Lee, Mass.

White Marble Lime Co., Manistique, Mich.

Glencoe Lime & Cement Co., St. Louis, Mo.

Ste. Genevieve Lime Co., St. Louis, Mo.

Rockland&RockportLimeCorp. New York—Rockland, Maine—Boston

Hunkins-Willis Lime & Cement Co., St. Louis, Mo.

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

National Lime & Stone Co., Carey, Ohio

Ohio Hydrate & Supply Co., Woodville, Ohio

Woodville Lime Products Co., Toledo, Ohio

Merion Lime & Stone Co., Norristown, Pa.

American Lime & Stone Co., Tyrone, Pa.

Riverton Lime Co., Riverton, Va.

Vermarco Lime Co., West Rutland, Vt.

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J. C. BUCKBEE COMPANY
ENGINEERS
BUILDERS OF CEMENT PLANTS

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Some people will buy only new electric motors, paying the highest prices without questioniug. But aren't you willing to spend two cents to find out whether you can get a used motor of that same type from us for much less? If the motor is of good design won't it do your work just as well if bought from us—as though bought new?

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3	50	Crocker-Wheeler	625
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2	50	Westinghouse	525
1	50	Westinghouse	450
1	60	General Electric	800
1	60	Northern	650
1	75	Westinghouse	850
1	75	Burke	375
1	90	Western Electric	525
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H.P.		3 Phase, 60 Cycles	Speed
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1	75	Gen. Elec.	1800
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Generators
Motor Generator Sets
AC Engine Units
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The following prices on 1800 RPM motors are net cash, f. o. b. Chicago, and subject to prior sale. If you desire 1200 RPM add 20% to the following prices:

1 H.P.	$42.00	5 H.P.	$ 72.00
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3 H.P.	58.00	10 H.P.	120.00
	15 H.P.	$145.00	

These motors are furnished with pulley and base.

We also have several thousand ¼ H. P. single phase, 60 cy., 110 V., 1750 RPM full load, constant duty motors, complete with cord, plug and pulley at $12.00 each.

Will cheerfully refund—if not satisfied.
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1—50 KVA 40 degree, either 2300, 440, or 220 volt, 3 phase, 60 cycle, 300 RPM Modern Revolving Field Type Ridgeway Generator, with Belted Exciter. Direct connected to and including an 11x12 Right Hand Simple Automatic Slide Valve Ridgway Engine. Outfit in very fine condition.....$1,400.00

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300 H.P. 40 degree Synchronous Westinghouse Motor, either 2300 or 440 volt, 3 phase, 60 cycle, 600 RPM, with direct connected Exciter. Outfit complete with type CR-1034, form JP-1 Automatic Transformer Starter, with overload relay and ammeter.....$2,250.00

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7½ H.P. New, 1750 RPM, Ditto..... 193.00
5 H.P. 1160 RPM, Ditto, with base and pulley..... 128.00
5 H.P. 1750 RPM, Ditto 111.00

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1—300 KVA, 40 degree Westinghouse, 2300 or 440 volt, 3 phase, 60 cycle, 600 RPM, Revolving Field Type A.C. Generator, with direct connected 6 K.W. Exciter. Complete with sliding base, rheostat, etc. Outfit same as new. Actually in use about one month...$2,250.00

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Price, each, without Switchboard.....$350.00
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100 H.P. 750 RPM, Northern compound wound.....$700.00
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60 H.P. 900 RPM, Bullock compound wound..... 650.00
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All of the above Motors are complete with rails, pulleys and starters. Condition guaranteed.

All equipment listed above now in our St. Louis warehouse—Some new—Some used. All Guaranteed and ready for Instant Shipment. Use the wires at our expense if interested.

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8—Ton

Vulcan Steam Dink

24-in. Gauge. First class condition.
Shop No. 542.

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423 SOUTH 5TH ST., MINNEAPOLIS, MINN.

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FOR SALE

We own and offer for sale a boiler plant consisting of twelve 1000 HP. Edgemoor Boilers built A. S. M. E. code for 200 lbs.—Foster Superheaters—Taylor Stokers—Diamond Soot Blower—together with feed water heaters, piping, valves, etc.—three steel stacks 250 feet high by 16 feet in diameter—complete coal and ash handling machinery—used three to six months—subject to your inspection—a bargain.

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Continuous pulverizing flint pebble mill for grinding feldspar, give full description and lowest cash price.

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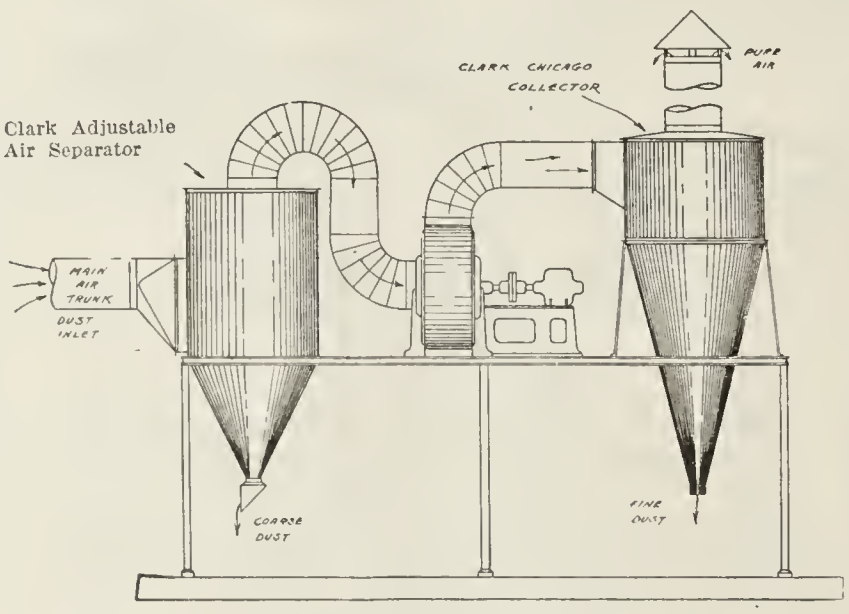
on waste heat boilers, kilns, raw or finishing departments, powdered coal, or wherever dust is made are profitable investments. Make your plant efficient and reduce accidents.

Norblo Suction Filters and Clarks All Metal Systems



The Clark All Metal System consists of Clark Chicago Collector, Fan and Adjustable Air Separator. This system can be used for the collection of dust of any kind, occupies minimum space, durable and efficient. The Clark Adjustable Air Separator insures longer life to the fan by separating the abrasive dust ahead of the fan, making two classifications of dust collected.

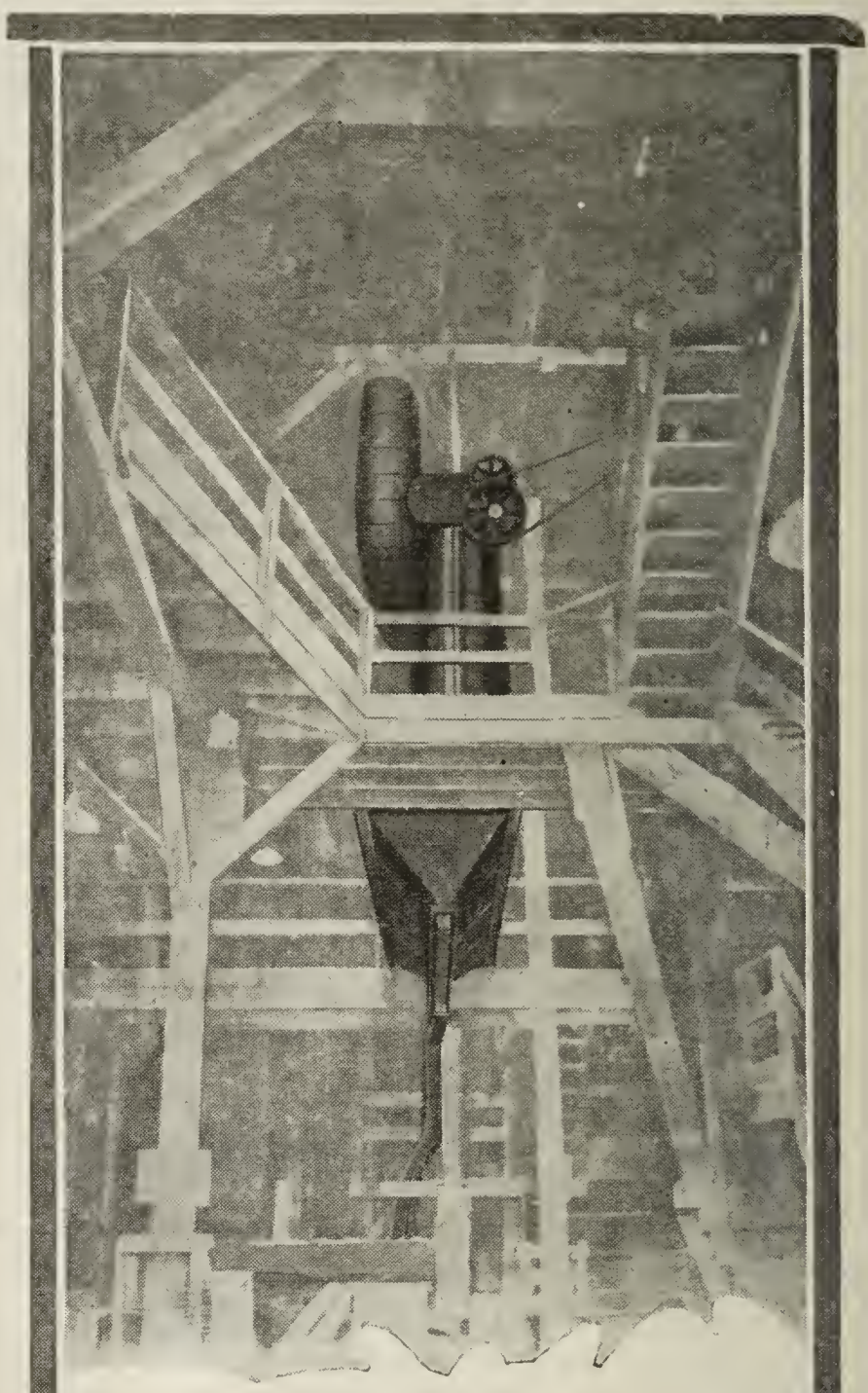
All Metal Systems reduce your fire and explosion hazards, insure longer life to your machinery and a better day's work from your employees.

Write us if you are interested in Pneumatic Conveying or Dust Recovery Problems

CLARK DUST COLLECTING CO.

Dust Collecting Engineers

Fisher Bldg., Chicago, Ill.



A Dust Collector Which Pays for Itself

By purifying the air which the men breathe in this plant, thus increasing their efficiency, and by salvaging the dust removed from the air, this Allis-Chalmers Dust Collector has paid for itself in a very short while. This device is installed in Hillsville, Pa., plant of the Carbon Lime Stone Company.

To collect the dust and keep itself in "collecting condition"—that is the problem solved by the A. C. Style B Dust Collector.

Ask for Bulletin 1454-O

ALLIS-CHALMERS
MILWAUKEE, WIS. U.S.A.

Merry Christmas

In time-honored phrase we send you the season's greetings. As the Yule-log crackles, figuratively or actually, on the family hearth, may the cares of the year take flight and a mellow brightness suffuse the future.

As we send you our greetings we urge you to prepare for full speed ahead, for 1922 business. The tracks are clear for general business prosperity.

Open wide the business throttle. Put on every ounce of steam. Business has rounded the corner and has a straight road ahead to greater and bigger prosperity. The increasing demand for cement, agricultural limestone and building materials shows real evidence of business revival and 1922 will be a prosperous year.

Industrial activities are expanding, building construction is increasing and public work, especially road building, is being pushed harder than ever and the farmers are getting better prices.

The country will need equipment and material of all kinds.

The Bradley Hercules Mill is more popular than ever. It's the largest preliminary machine manufactured adapted for pulverizing cement rock, limestone or clinker. New installations every month and wonderful reports from all users indicate this mill will soon displace all other preliminary pulverizers in cement mills.

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Works: Allentown, Pa. BOSTON, MASS.

Manufacturers of Pulverizing Machinery for 30 Years

CEMENT AND ENGINEERING NEWS

with which Gravel & Stone Magazine is Incorporated

22 Quincy Street, Chicago.

(PUBLISHED MONTHLY)

William Seafert, *Publisher and Editor*

J. F. Waldron, *Advertising Manager*

R. M. McCully, *Business Manager*

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Advertising copy or changes in ads. must be in this office by the 25th of each month, as hereafter our magazine will appear on the 5th of the following month

Advertising Rates Sent on Application

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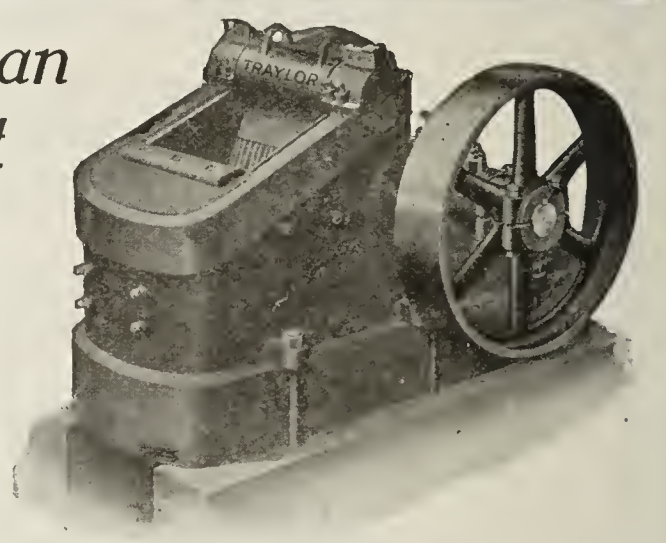
Traylor "Bulldog" Jaw Crushers Mean a Saving at Any Crushed Stone Plant



One method of designing crushers is to make them so massive throughout that it is practically impossible for them to be subjected to strain. Yes, they crush but the cost of operation is terrific.

Traylor Engineers strove to design the lightest yet the strongest crusher possible, that's why the frame of every "Bulldog" Jaw Crusher has a steel band shrunk on it top and bottom and all are equipped with the "Bulldog" Toggle system, the pitman of which is by far the lightest yet strongest of its kind being; made of wrought-steel tension members.

And it's this fine balance of weight and strength that makes the "Bulldog" crusher so economical to the user. Ask your neighbors about the power costs of their "Bulldog" Crushers.

TRAYLOR ENGINEERING & MFG. COMPANY, Allentown, Pa.

New York Chicago Pittsburgh Los Angeles Spokane

Truck and Tractor Division, Cornwells, Bucks Co,, Pa.

For Immediate Delivery

10 in. x 20 in. Type "A" Jaw Crusher
14 in. "Bulldog" Gyratory Crusher
No. 7½ Gyratory Crusher
36 in. x 16 in. Type "A" Crushing Roll

And the Same Economy That's Found in Traylor "Bulldog" Crushers is Built in Traylor Motor Trucks and All Purpose Tractors

Strong at the points that are usually weak in other kilns.

VULCAN Kilns are built with due regard to distribution of weight and to take care of overload. The roller bearings and driving gear are constructed to protect them from the unfavorable conditions under which they operate. The tire construction is original with Vulcan and has given excellent results.

It has been said of VULCAN KILNS:

"Strong in Every Detail"

This is true because the detail of construction is not forgotten after the best design has been established.

VULCAN IRON WORKS

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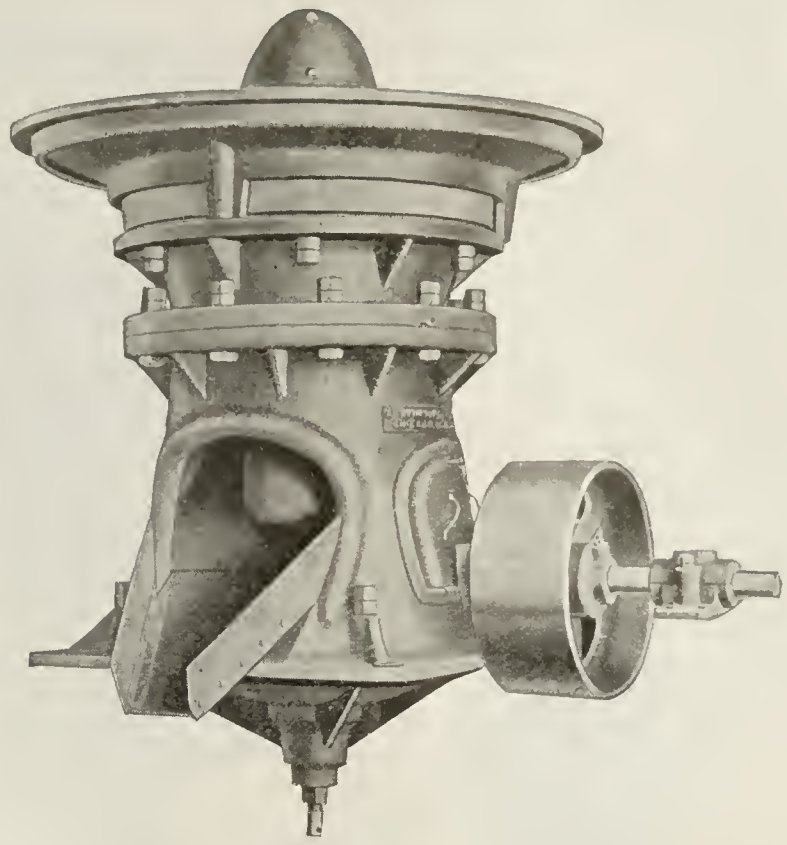

The Only True Basis of Comparison Between Crushers is that of Cost per Ton of Output over a Long Period of Time

First cost, operating expense, production figures—each means nothing by itself. What counts is LAST COST, and that can only be expressed as the average cost to produce a ton of crushed stone.

Judge Austin Gyratory Crushers on any basis you choose, and they make a fine showing; but it is on the Last Cost basis that these Crushers should really be judged, for then the exclusive Austin features which increase production and reduce expense make themselves felt unmistakably.

Austin Gyratory Crushers are made in stationary and portable types and in eight sizes, having capacities of from 5 to 500 tons per hour.

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Austin Manufacturing Co.

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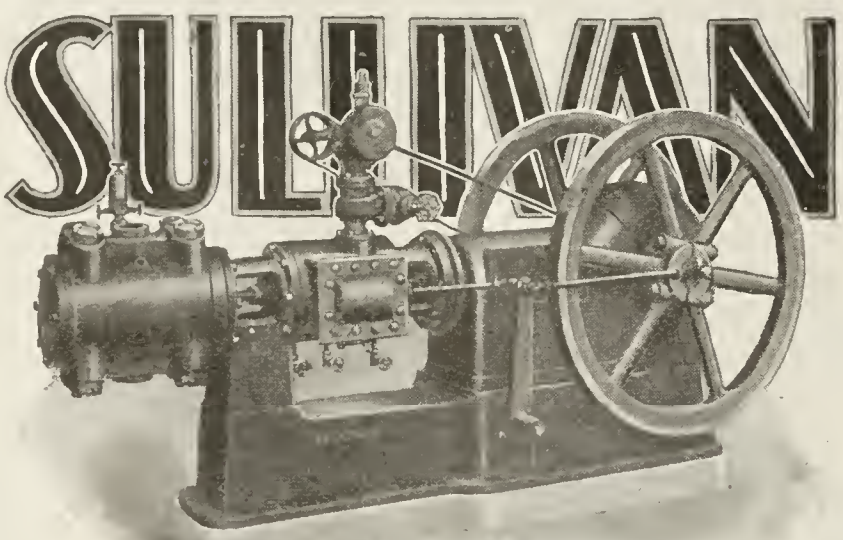

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WA-6 Compressors are simple, sturdy and almost automatic. They provide a constant air power supply at low cost for fuel, upkeep and attendance.

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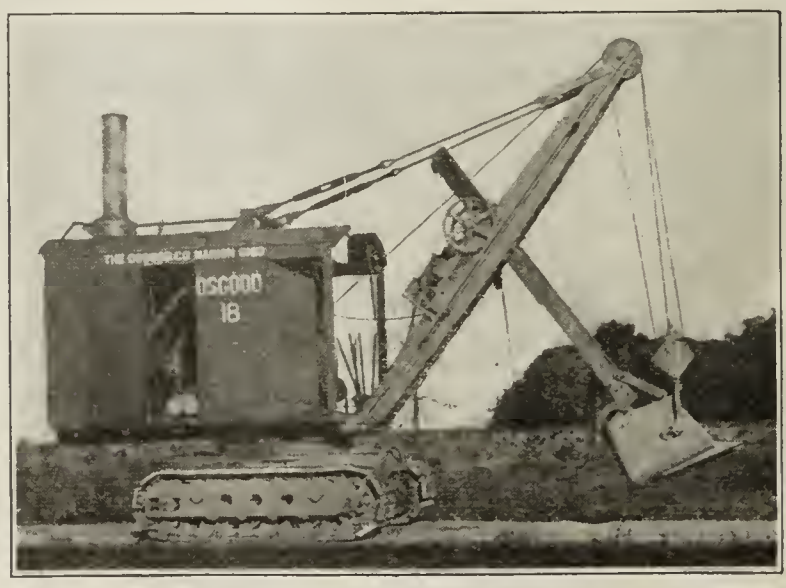

¾ cu. yd. Revolving Type with Power Steering Mechanism.

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1,500 FT. 20-INCH O. D.

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RANDOM LENGTHS 16 TO 20 FT.
OF GREAT VALUE WHEN USED FOR

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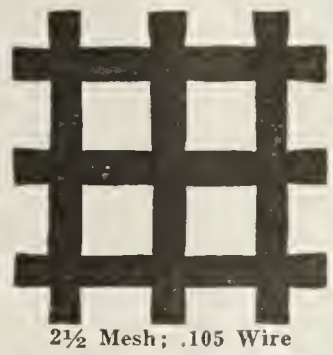
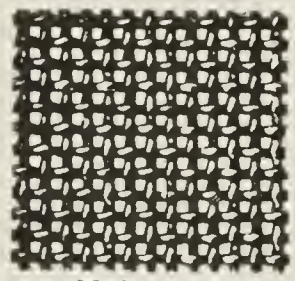
930 W. 19th Place **CHICAGO**

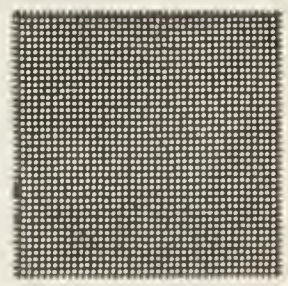
Cleveland Double Crimped WIRE CLOTH



2½ Mesh; .105 Wire



12 Mesh; .047 Wire



40 Mesh. .0135 Wire

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Our product is so satisfactory that the initial order invariably makes a permanent customer for us.

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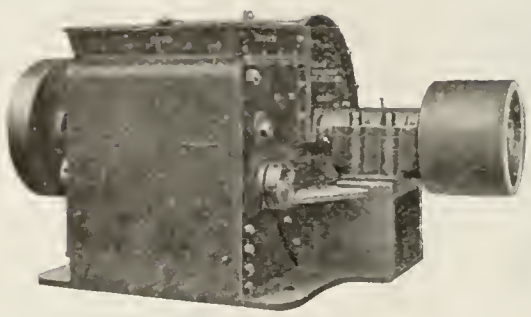

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is an assurance of exceptional economy and dependability in your crushing and pulverizing.

The Dixie Crusher is the result of 30 years' experience in the manufacture of all kinds of crushing and grinding machinery and is a perfect product in every respect.

It is simple, durable, efficient, turns out a uniform product at a minimum cost in power and maintenance, built in any size from one ton to 500 tons per hour.

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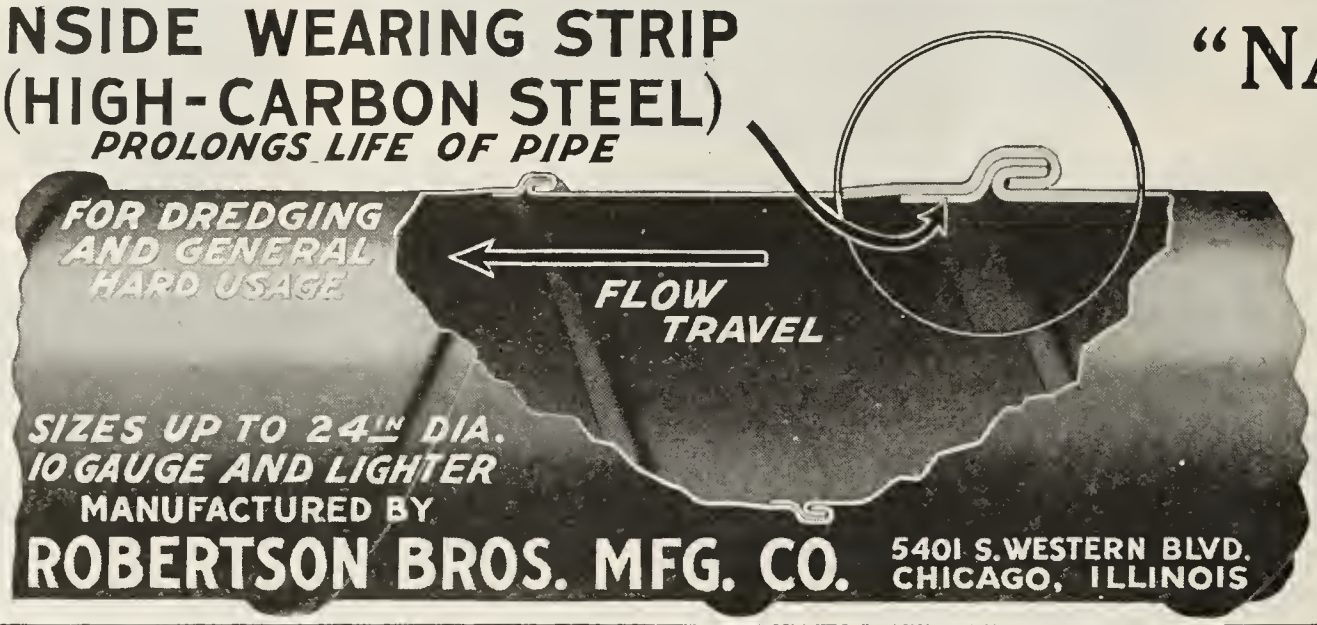

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Your plant is a success, of course. You have made it such by devoting your energies to it, by carefully studying out every possible way to increase its efficiency and economy of operation. It represents and reflects your personality.

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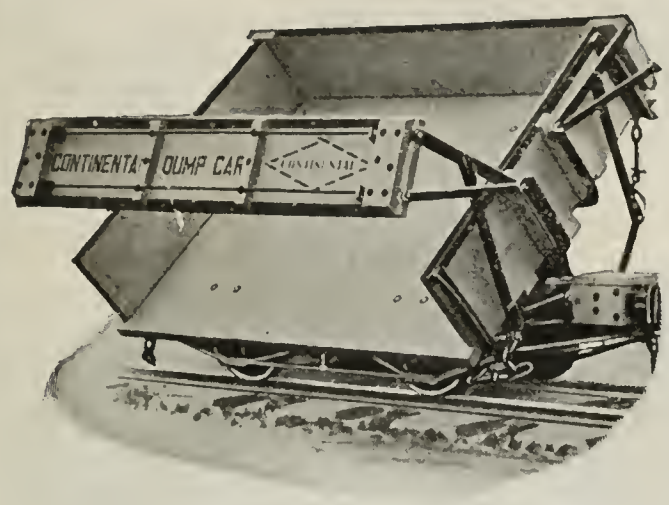

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For staunch construction, quality of materials used, general all round serviceability and satisfaction, they challenge all competition.

We build all sizes and types of industrial cars for any specific requirements. Write us concerning your needs.

Continental Car Co. of America, Inc.

General Sales Office and Works, Louisville, Ky.

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A large number of contractors and cement, lime, crushed stone and sand and gravel producers—both large and small—have found from actual experience that the dependable service always obtained from Taylor Mesaba Steam Shovel Chain enables them to keep their output up and their operating expense down.

Taylor Steam Shovel Chain is a product of many years of practical chain making.

Every individual link is correct in size and shape, smooth finish, swedged to long taper, welded on end, with length of weld not less than twice the diameter of the iron.

These details are watched by master workmen, whose life work is the making of good chain.

Sizes carried in stock—¾", ⅞", 1", 1⅛", 1¼", 1⅜", 1½", and 1⅝". When you need chain for strain, order Taylor Mesaba.

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BARGES

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STEEL BARGES—SCOWS—
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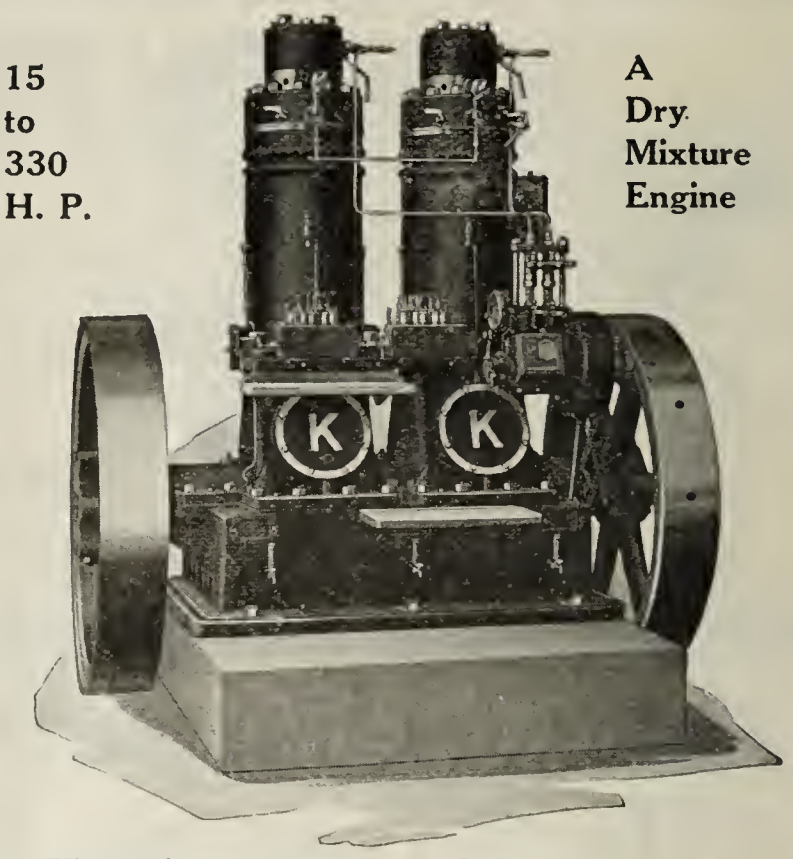

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Improved Anderson Oil Engines

Operate economically on the cheapest grades of black fuel oil with little or no smoke or exhaust residue. They handle all loads successfully, drive from either side or rotate either way. Made like a "Swiss watch" for people who appreciate real quality and up-to-date design. Our Literature tells the whole story. Write for it now.

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FOUNDED IN 1872 CAPITAL $1,400,000.00

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SOFTENING & FILTRATION
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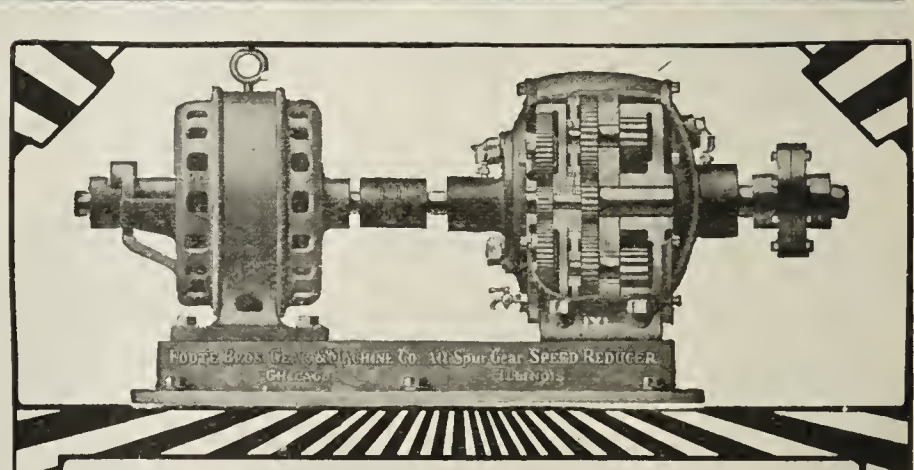

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Write to us, state the conditions that exist in your plant, and get the advice of our engineering department.

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(Canvas Stitched)
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CONVEYOR BELTS A SPECIALTY

Specify Nuttall BP Gears

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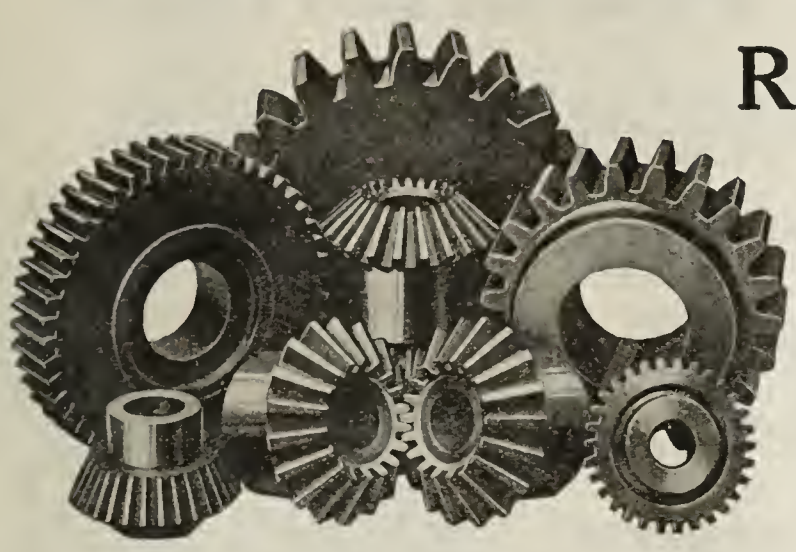
Reduce Maintenance Costs



Frequent renewal of gears due to breakage and wear means heavy maintenance costs.

The cost of Nuttall BP Gears is slightly above that of untreated gears, but they are guaranteed to give four times the life of the latter in identical service. The saving in the long run is obvious.

We manufacture cut-tooth cement mill gears in any type or size.

It will pay you to investigate the advantages of BP Gears.

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VALVE BAGS
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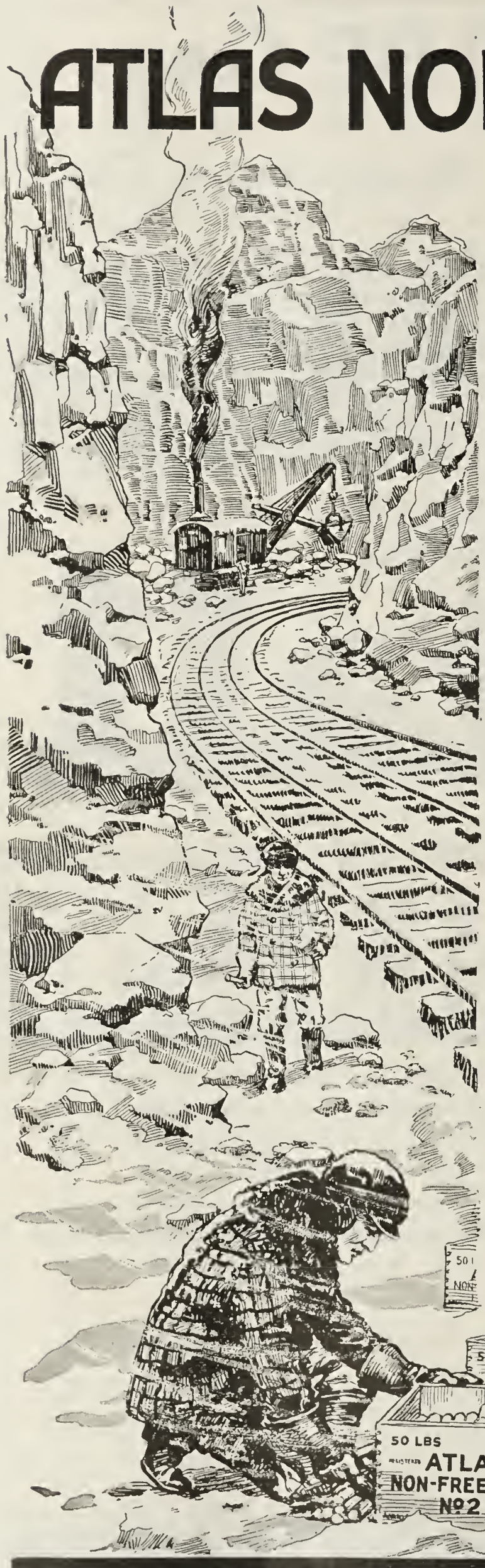
If your plant is a steady producer of Cement, Gypsum, Lime, or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

THE BATES VALVE BAGS are filled by the Bates Packer without mutilation. They seal automatically and are easily handled.

THE VALVE BAG CO. OF AMERICA

TOLEDO, OHIO

ATLAS NON-FREEZING



will not freeze—eliminates thawing and headaches

In the most exhaustive tests in both laboratory and field, this new explosive—Atlas Non-Freezing—has withstood the lowest temperatures known to man. It has been used for all explosive requirements and its efficiency has been fully proved in quarries, pits and mines; in rock, earth and ore—all at temperatures varying from that of torrid to the coldest found in the land of perpetual snows.

Atlas Non-Freezing has the same stability and uniformity that characterize other Atlas high explosives. It will not explode prematurely. No objectionable fumes are given off on detonation. Its use eliminates the headaches that attend the handling of ordinary explosives.

Atlas Non-Freezing is made in five grades, thus covering all blasting requirements.

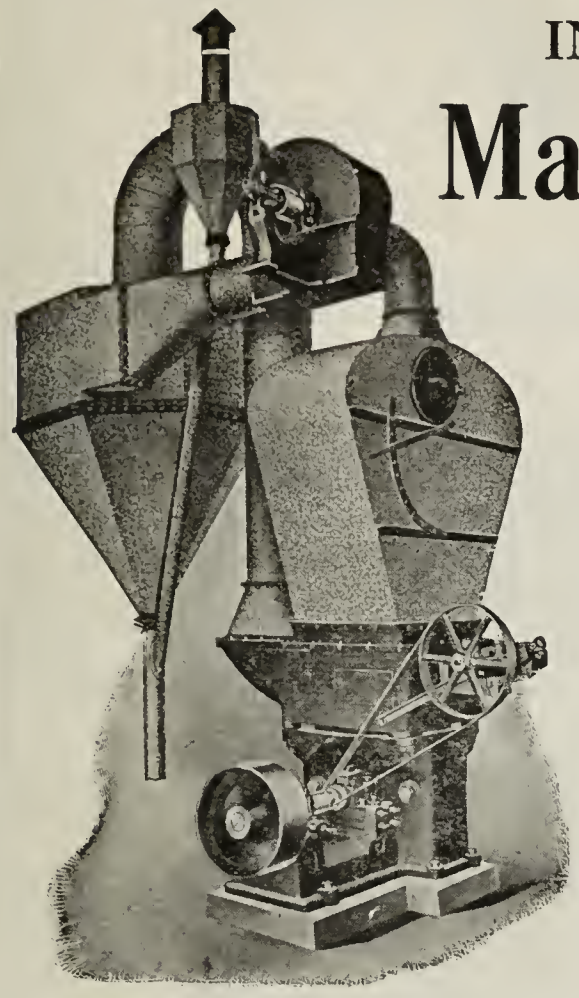
Tell us what explosive you are using now and we will tell you what grade of Atlas Non-Freezing will do the work and save you the inconvenience which attends the use of explosives that are not immune from the effects of cold.

ATLAS POWDER COMPANY
Wilmington, Delaware

Branch Offices:—Allentown, Pa.; Birmingham, Ala.; Boston; Chicago; Des Moines, Ia.; Houghton, Mich.; Joplin, Mo.; Kansas City; Knoxville; McAlester, Okla.; Nashville; New Orleans; New York; Philadelphia; Pittsburg, Kans.; Pittsburgh, Pa.; Pottsville, Pa.; St. Louis; Wilkes-Barre.

NO thawing — NO headaches — NO objectionable fumes

Complete Grinding IN ONE Machine



In successful use grinding Cement, Clinker, Limestone, Coal

INSTANT REGULATION OF FINENESS

NO DUST

Send for Circular

THE BONNOT CO.
CANTON, OHIO

Parallel-Flow and Counter-Flow Combined in One Dryer

Ruggles-Coles Double Shell Dryers operate on the principle of "parallel-flow"—material travelling in the same direction as heat flow—while in contact with the inner shell; and "counter-flow"—material travelling against heat flow—while dropping through the returning hot gases.

Other types of Ruggles-Coles Dryers have been developed. There are 8 types in all, each with its distinct principle of operation to meet all commercial drying requirements.

Ruggles-Coles Engineering Co.
120 Broadway, New York, N. Y.

Ruggles Coles Dryers

A Sturdy, Hardy Machine that Stands Up Under the Toughest Kind of Work

When material must be moved, day in and day out; when a break in transportation means idle hands, lost money, or precious time—that's where the American Locomotive shines.

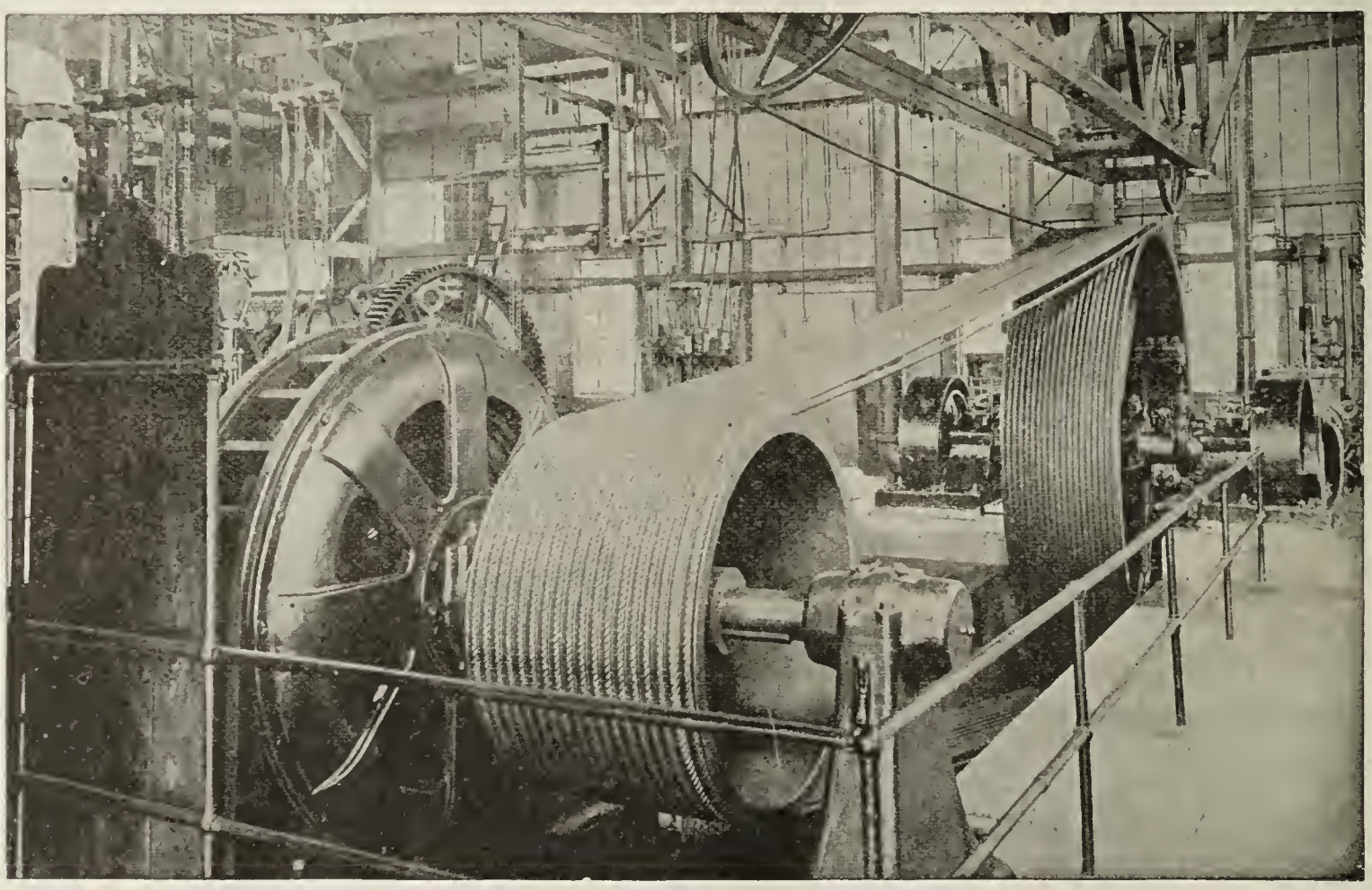
The American "Gas-O-Motive" speeds up the equipment and the organization. It embodies exclusive features and principles worthy of its name.

If you have haulage work to do, let the American "Gas-O-Motive" do it.

Hadfield-Penfield Steel Co.
Bucyrus, Ohio

DODGE

Rope Transmissions



Dodge Rope Transmission in Cement Plant

For Large Generator Installations

Dodge rope drives are the most satisfactory and economical method of transmitting power from the prime mover to the generator. For flexibility they are unequalled — the same efficiency is maintained regardless of location of sheaves. They can be close together, far apart, in line, around a corner or at an angle.

Under reasonable over-loading efficiency is increased rather than decreased.

Power is transmitted without slippage—the exact speed ratios represented by sheave diameters may be relied on in actual service—this eliminates guess work in speed calculations and waste of power as a result.

These features alone should prove that the Dodge Rope Drive is worthy of close investigation.

Dodge Sales and Engineering Co.

General Offices: Mishawaka, Ind. Works: Mishawaka, Ind., and Oneida, N. Y.

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Philadelphia Cincinnati New York Chicago St. Louis Atlanta Boston Pittsburgh Minneapolis Houston Seattle Newark San Francisco

Cement and Engineering News

Vol. 33 Chicago, December, 1921 No. 12

GREETINGS

The Season's Greetings to you and yours, with the sincere wish that during the coming year you will be blessed with happiness and prosperity.

Merits of Concrete Trimstone

Concrete products manufacturers very often conclude that architects of prominence are unalterably prejudiced against concrete building units. This, however, is not true. Architects are prejudiced against poorly made concrete whether it is in precast units or in monolithic construction. From an architectural standpoint there is no objection to the use of concrete block, brick, hollow tile and architectural trimstone providing they are properly made and the structure in which they are used is correctly designed in accordance with good architectural practice with due regard for the characteristics of the building medium to be employed.

Molded concrete trimstone or art stone is rapidly winning a place as a recognized building material. It is being used in large and important buildings and is coming into general favor where intricate ornamentation is required. It competes successfully with carved natural stone. Its employment is less expensive than natural stone. This is especially true where a number of replicas of the same design are required. The fact that an unlimited number of concrete castings can be made from a single mold greatly reduces the cost of production. However, even if only one medallion or placque is to be used on a building it would, perhaps, be less expensive to cast it in concrete than to carve it from natural stone. This because of the fact that the stone carver must first make his model in clay and laboriously chip and carve it from the rock.

Concrete trimstone can be much more rapidly manufactured than natural stone can be carved. Another advantage of the molded concrete is that the entire process of manufacture may be carried on in a factory during inclement weather while in ordinary practice stone carving is done on the building site. During adverse weather conditions such work must be halted.

One of the most beautiful of Chicago's many theaters is the recently completed Apollo at the corner of Randolph and Dearborn streets. The building was designed by Holabird & Roche, prominent Chicago architects, and is a noteworthy exemplification of Grecian architecture.

The Apollo theater was built for the estate of Leander J. McCormick and Al Woods by the Longacre Engineering & Construction Co. during the winter and early spring of 1920-1921. It is reported to have cost about $750,000. Interior decorations and furnishings are of the highest quality. The exterior furnishes a striking example of the marvelous adaptability, beauty and utility of precast ornamental concrete.

Decision to use precast concrete for the ornamentation of this building was made by the architects with the conviction that ornamental precast concrete, when properly made, will render service, esthetic and utilarian, comparable with that of carved natural stone. This decision was influenced by the economy of concrete and the fact that the design called for much duplication of ornamental units.

All of the ornamentation on this building is precast concrete furnished by the Architectural Decorating Co., 1600 South Jefferson street, Chicago. The plain ashlar units are No. 1 buff Bedford stone which the concrete matches in color and texture with almost absolute fidelity. It is safe to venture the statement that no one in the multitude passing the theater detects any difference in the two materials.

Among the more prominent of the intricate and complicated features reproduced in concrete for this building are the seven griffons or winged lions between the columns and pilasters, the 13 medallions or placques representing mythological characters and symbols and the fluted Corinthian columns over the main entrance. All of these special features are cast in one piece, with the exception of the fluted columns, and in none of them was vertical jointing permitted.

Precast concrete of simpler design forms the various belt courses, cornice, main coping frieze and other ornamental features. Units forming the two rusticated piers adjacent to the rounded corner are also of concrete. All concealed surfaces were given a heavy coating of R. I. W. waterproofing manufactured by Toch Bros., New York City. During cold and inclement weather walls were covered with canvas and the trimstone placed.

All ornamental concrete was cast in the extensive factory of the Architectural Decorating Co., which, in addition to the manufacture of ornamental concrete, produces many other products, of various materials, for the exterior and interior ornamentation of buildings. Concrete used was of 1:3 mix. Facing aggregate was crushed Bedford stone proportioning of which is a secret formula obtained by many careful experiments.

Fuel Oil Engines

The Hadfield-Penfield Steel Company of Bucyrus, Ohio, have secured the contract for the engines and generators in the municipal light plant at West Point, Nebraska. The equipment consists of two 150 horsepower vertical standard fuel oil engines which are to be direct-connected to alternating current generators.

Good Roads Congress and Show

Extended discussion by noted highway engineers from all parts of the United States and Canada relative to design, methods and materials used in modern highway construction will form a large part of the program of the American Good Roads Congress, to be held at the Coliseum, Chicago, Ill., on January 17-20, next, under the auspices of the American Road Builders' Association, the oldest and largest organization of its kind in the country.

Three of the eight sessions of the Congress will be devoted to a discussion of new methods used in the building of asphalt, concrete, brick and other modern pavements. The economical construction and maintenance of the cheaper types, such as waterbound macadam, sand-clay, gravel and earth roads, which constitute nearly ninety per cent of the 2,273,131 miles of highways in the United States, will also be discussed.

One session of the Congress will be given over to the consideration of problems of highway finance and administration. Because of the high interest rates now prevailing on road bonds, approximately ten per cent has been added to the cost of road construction from this source alone. Increased freight rates have added a like amount. Since many states are fast approaching their permissible bonded debt limit, the methods of raising and expending road funds are becoming vastly important and road officials are bending all their energies toward securing greatest returns for expenditures.

Invitations to the Congress are being sent to nearly 30,000 Federal, state, county and city officials, Contractors, Engineers and business men in the United States and Canada. It is expected that the attendance will greatly surpass the record set last year and that the Congress will develop a clearer understanding of diverse highway problems, so road officials may, in spending their funds, secure "more roads for less money."

No less important will be the National Good Roads Show to be held at the Coliseum in conjunction with the Congress. This show will contain close of $1,500,000 worth of labor-saving road machinery appliances and materials and highway transport equipment. At the October drawing for exhibition space the entire 40,000 square feet of available space in the Coliseum and Annex was taken, necessitating the lease of additional buildings to care for the manufacturers now applying for room.

The use of labor-saving machinery during the past few years has revolutionized road construction methods and the coming show will offer an opportunity to all persons interested in road work to see in actual operation the most recent mechanical developments in the field. More than $100,000,000 worth of road machinery is being manufactured annually, a sum greater than the combined value of all other construction machinery produced. The machinery and material manufacturers with exhibits will have special representatives at the show to explain their machinery and paving materials.

Opportunities for the Sand or Crushed Stone Producer

As an adjunct of a commercial sand and gravel or quarry plant, the manufacture of concrete brick, blocks or tile would have the advantage of furnishing an occupation to a small crew of men, who would be available for emergency work in the sand and gravel or crushed-stone end of the business in times of extra large demand, or vice versa, the block or brick plant would furnish employment to the sand and gravel plant employes during dull periods.

It is obvious, of course, that there is not a big profit in a small operation of this kind. Like the business of producing every other low-priced commodity, there must be quantity production to make it profitable, for with quantity production the output per man would rise rapidly, as many labor-saving devices could be added

However, the concrete-brick, block or tile business has advantages possessed by very few other building-material lines. A producer can start with a small investment, a small demand for the product and a correspondingly small output and increase his production with a minimum expenditure of new capital as the business is built up. If he starts with a well-planned first unit he may double and triple or quadruple his output and still preserve all the efficiency in production that would have been attained in building the larger plant originally. Few industries offer this same opportunity of experimenting on a small scale with a plant that can be built on efficient commercial lines.

Formula for Making Lime Products

J. L. Goffette, 1631 Yew St., Vancouver, B. C., has a patented process for the making of special lime products and would like to interest people who would like to put these processes on the market. He will sell the formulae outright or will connect the comapny to manufacture them on a percentage basis. He writes:

Firstly: I have the process for the making of a lime,

A. which resists eternally to atmospheric action.

B. which resists the sea water element.

C. which mixed with portland cement, 25% by weight does not affect the strength of the cement.

Secondly: A process for the making of any portland cement rapid setting—supposing a cement setting in ten hours that cement can be made to set in five minutes and stand in the water immediately.

Thirdly: A process for the making of portland cement resisting alkali soil, and with security to sea water.

Persistent Advertising Pays

There's a moral for advertisers as well as non-advertisers in a letter we received the other day from the Curtiss-Willis Company, of New York. Here is what they say:

"Through the influence of your journal and the fact that we kept our advertising running with you during the whole summer, in spite of the universal depression in business and the pessimistic feeling regarding business, this work is now bringing us in some nice orders."

Persistent advertising in the right publication still continues to pay.

The Geometry of Progress in Structural Engineering or Euclidian Principles Applied to Stress Analysis and Volumetric Measurement of Mechanical Intelligence

By C. A. P. Turner, M. Am. Soc. C.E., M. Am. Soc. M.E

During the past twenty years although amazing progress has been achieved in the mechanical, electrical and chemical branches of engineering endeavor, the structural engineer has advanced little in precise knowledge of internal states of stress in elastic materials of constructing upon which their strength or resistance depends.

The idiosyncracies of building code provisions for shear, the long and unsuccessful endeavor of our joint committee to decipher the correct bending moment in an ordinary column supported slab and the inconsistencies of the research work illustrated in University Bulletins and the technological papers of the U. S. Bureau of Standards indicate a backward rather than forward trend of theoretical progress.

The cause lies in the general effort to settle all questions in the twilight zone between the known and unknown by the majority vote of engineers in convention assembled.

This Soviet dream of real democracy in the field of scientific research has been so vigorously promulgated by the pedant of Purdue that it has actually been adopted by the American Society of Testing Materials. It is most popular with lackadaisical intellects in need of an accommodating George to do their thinking for them.

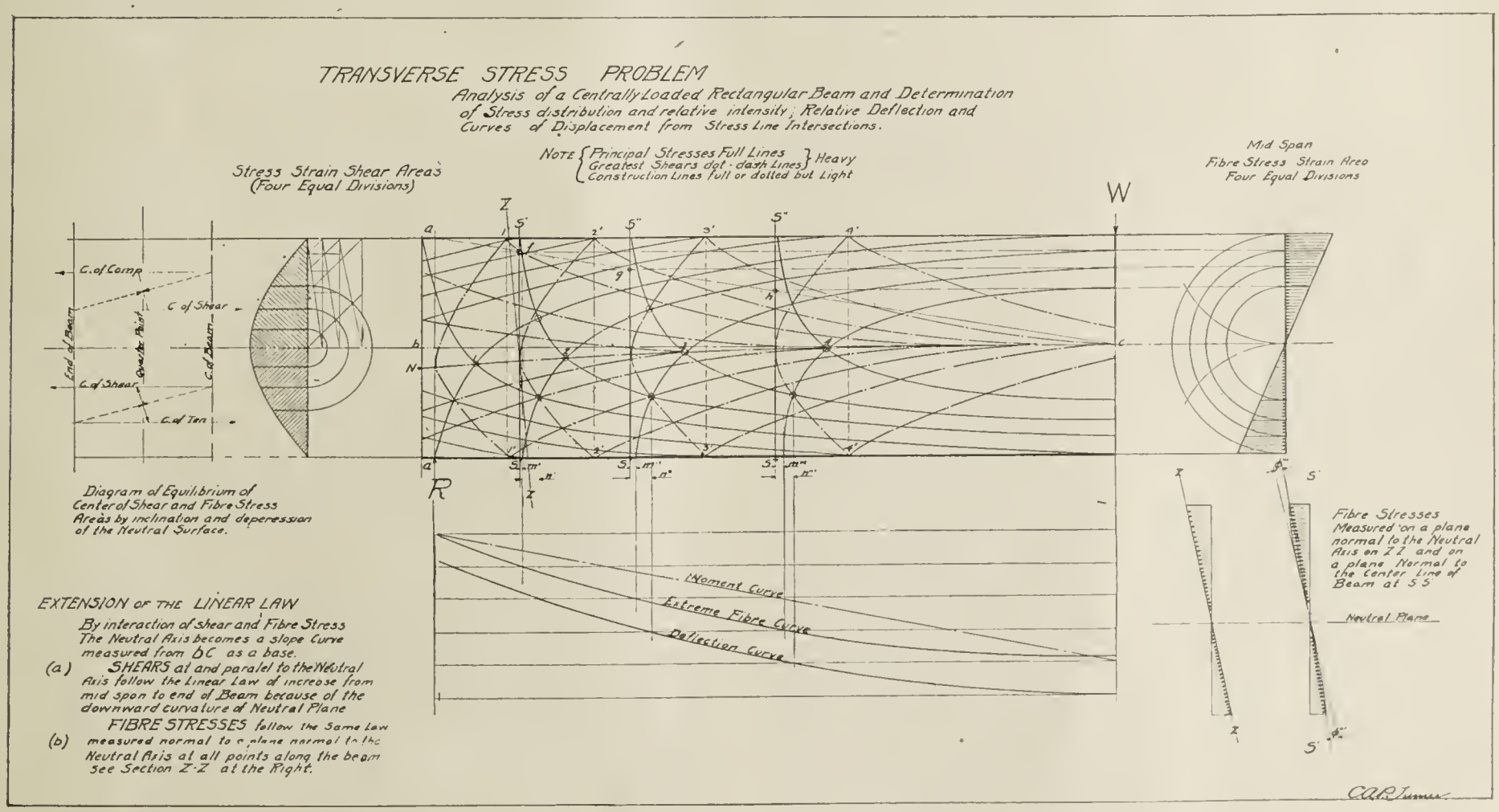
Mental aberration results from belief in that which is not so. Merely voting that a false belief is true does not rectify the blunder.

Thus, we observe the unanimous vote of the Eighth Circuit bench (219 Fed.) that a flat arch is the same in principle as a continuous plate reversing the engineer examiner of the patent office, in decreeing that putting the steel in the top of a concrete floor is the plain mechanical equivalent of putting it in the bottom. This was deduced from unwarranted acceptance of the testimony of our Joint Committee Doctor whose prodigious negative knowledge is disclosed in his belief (Trans. Am. Soc. LXXXII) that the remarkable transverse strength of a column supported slab must be accounted for by the persistant resistance of the tensile stress in the concrete after it has broken down in tension instead of attributing the admitted excess resistance over that of beam action rationally to the operation of shearing stresses to be illustrated graphically in the discussion to follow.

Thus, the uncertainties and erroneous assumptions of the engineering fraternity when digested by our blind lady of the sword and scales are so fitted together that they present a perfect mosaic of contradictions—and exquisite *"reductio ad absurdum"* by the application of blind logic unguided by fundamental natural laws.

Reading present day treatises on tests and mechanics of materials reminds one of the old colonial text books on chemistry. Some forty years ago when rummaging in the attic under the hewn oak rafters of the old New England homestead one of these books was found and the following recollections of its contents are to the point:

With pedantic particularity there appeared a complete treatment of the characteristics and properties of the mysterious element—phlogiston—the thing that never was—as Lavoisier's investigations later disclosed. Likewise, in the technological papers No. 11 of the U. S. Bureau of Standards, we find measurements made with particular care and meticulous extensometric precision of the downward displacement of the neutral surface of the



concrete beam from where it never was except in the misconception of the parabolic theory of its location.

The writer attributes the general lack of progress to thoughtless acceptance of an approximate theory of flexure as all that may be desired, leaving the action of shear a mystery concerning which there is the greatest amount of guess work and contradiction of opinion amongst engineers. The complexity of the formulas involved in the mathematical theory of elasticity contributes to the same result.

Since the fundamental relations of elastic stress and strain depend upon the parallelogram principle it would seem unnecessary to compare their magnitude by involved transformations of quadractic functions of two or three variables involving an array of direction cosines appalling to any but the professional mathematician who little appreciates the problems and needs of the structural designer.

The extreme generalization of the mathematical theory (see Love, Ibbetson, Todhunter, et al) better fits it for the determination of the waves of ether in space than for application to the specific problems of structural engineering.

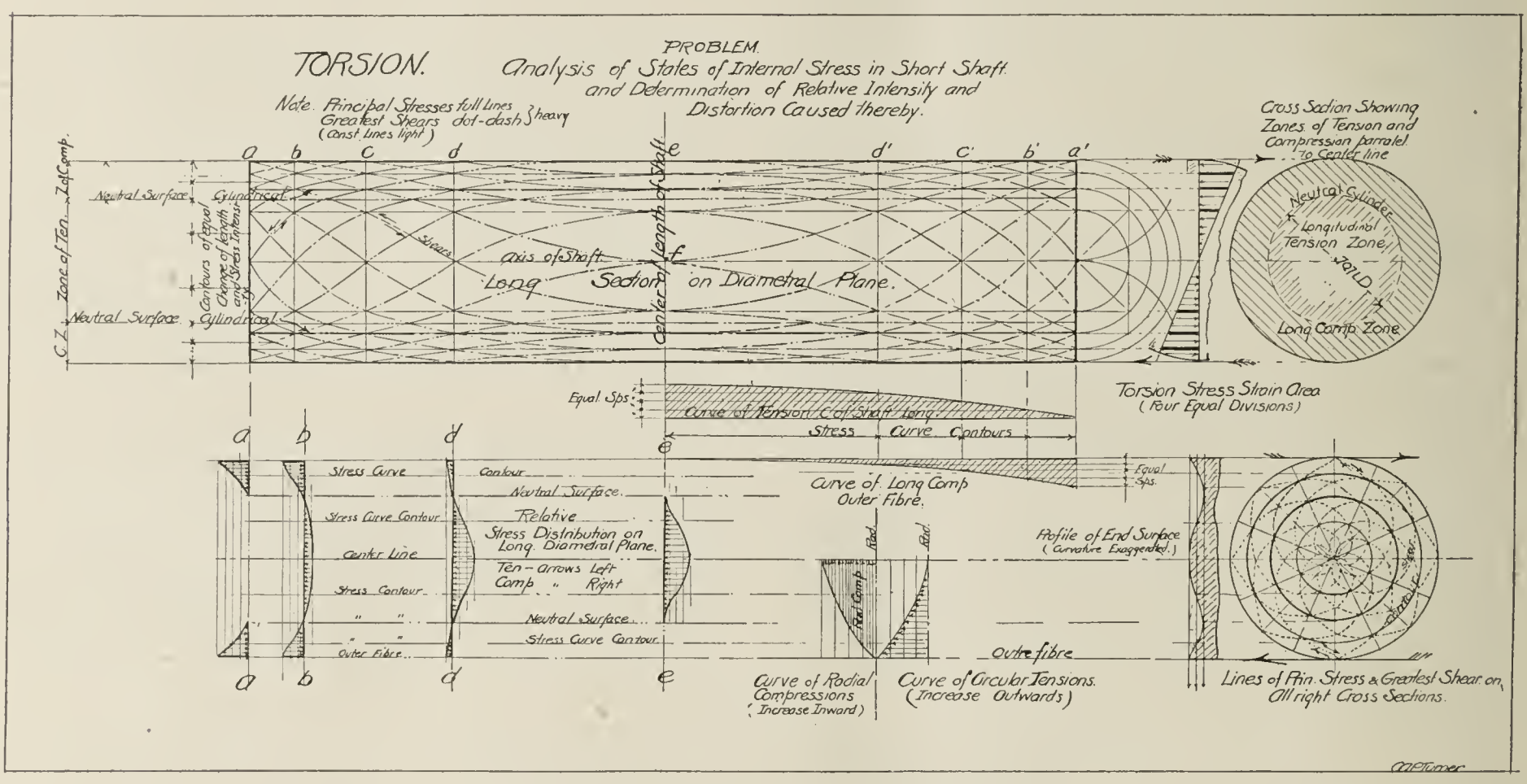
The principles underlying the application of the parallelogram of forces to states of internal stresses are clearly treated by Eddy, Researches Graphic Statics, 1878.

Suppose a cutting plane passes through a point in the plane of stress perpendicular to that plane, then when this cutting plane is rotated 180° it passes through two lines 90° from each other on which normal to the cutting plane there is no shear and the state of stress may be determined without defect by the magnitude of these principal stresses at right angles to each other. When the principal stresses are equal and of opposite signs then at 45° to the direction of principal stresses lie the planes of greatest shear on which there is shearing stress only of an intensity equal to that of the principal stresses. In the case the principal stresses differ in intensity and are of opposite signs then the planes of greatest shear are not at right angles to each other but their intersection is bisected by the lines of principal stress. This fundamental relation furnishes a definite check upon any erroneous determination of coordinated intersecting lines of greatest shear and principal stresses that may be drawn to represent the state of internal strain in a body elastically deformed.

Torsion is the simplest state of internal stress illustrated by the twisting of a short shaft, Fig. 1. This twisting sets up spiral tensions and compressions along the surface of the shaft producing radial compressions and circular tensions on its transverse cross-section. Since the circular displacement would be uniform the lines of greatest shears on the transverse section are symmetrical spirals drawn at the lower right corner of the figure and the radials are both lines of zero shear or balance of shear and principal stress lines as well.

Since the forces producing the torsional couple are 180° apart the spiral shears must change direction to become tangent to the diameter through their point of application in 180°.

Divide the radius into four equal parts from the center. Draw concentric circles there through, thus dividing the diameter into eight equal parts. Divide the 180° spiral pitch into eight equal parts or 22½° angles and draw radial lines through these divisions. Consecutive intersections of the radial and circular lines will be points on the spiral shear curves which fix their direction.



The law of coordination of shears and principal stresses is that of alternate contours of location or equal distances and contours of equal changes in form or intensity of stress, analogous to the odd and even rule of the moment magnitude equations applying to stress and shears of continuous and restrained beams. (See Concrete Steel Constr. by Eddy and Turner, 2nd. Ed. Chapt. VII).

Thus, the relative curvature of the end of the shaft is readily drawn from the contours as shown at the left of the figure (Curvature, of course, being greatly exaggerated).

Reverse summation of tension and compression is the fundamental characteristic of torsion or twist illustrated in the curve of radial compression increasing inward from zero at the outer fiber to a maximum at the axis by equal increments as determined by the shear contours and conversely the curve of circumferential tensions increasing by equal contour increments from the center outward.

Having now discussed the state of stress in the transverse cross-section turn to the longitudinal in the upper part of the figure. Normal to this section twisting shear forces act of intensity varying in accordance with the linear law, represented by the torsion stress strain area at the right. Project these points of division across the elevation and they present coordinated lines of principal stress.

Law of summation of deformation is that since the twist at one end balances the reaction at the other angular deformations must sum from the center toward the ends following the linear law. Draw construction lines from f the center of the shaft to a and a′, and from the intersections with the horizontals erect perpendiculars b, c, d, b′, c′ and d′ which divide the total longitudinal distorsion which changes the curvature of the end into equal parts.

Curves drawn through these intersections will be the lines of greatest shear and will indicate the *neutral cylinder* where tension and compression balance by equal division of the number of shear diamonds between the center and outer fiber.

The longitudinal distribution of tensions and compressions is shown at a, b, d and e. Again, we note the law of reverse summation of longitudinal tension and compression in torsion. The law of summation of deformations deserves study. No longitudinal deformation occurs at e where the tension is greatest but a bulge at the end resulting from the summation of stretching along the axis.

The equations of symmetrical torsional stress curves has been so thoroughly presented by St. Venant that they will not be here discussed.

After carefully preparing the foregoing seemingly clear diagrametic exposition of torsion, the author put its lucidity to test by submitting it to an assistant for a report which was presented in the statement that the language was that of descriptive assertion without demonstration conveying a clear conception of the matter to his mind!

Feeling almost as weary as the new machine shop apprentice who had diligently inquired consecutively of Brown, Smith and Jones, the location of the left handed monkey wrench and the half round square which he was directed to find and had been referred to Peterson, Carlson, Ole and Pat by them to Nelson, Spagetti and Michael without discovering it, the author, nevertheless, undertook to reduce his assistant's Sunday School education in mechanics to a common every day working basis as follows:

Suppose the shaft of very elastic material such as india rubber and it is twisted through such an angle that the surface points on an element a unit apart have slid by each other half a unit. Then half way between the surface and the center points on the same radius have slid by each other a quarter unit—the spiral displacement, therefore, has half as great pitch on a central cylinder of half the diameter. The difference in pitch shows a twist about each radial line and were it not for the present of twisting shears about the radius as an axis the torsional shears would be set up on the surface tensions and compressions at 45° to the axis of an element.

The twist about a radial element is balanced by the longitudinal stresses of tension and compression parallel to the axis of the shaft and serves *to shift the torsional shears along the shaft* and, thereby, equilibrate the applied torsional couple at one end by the resisting or power couple at the other end.

Consider now the condition of an element at the end of the shaft. It is quite free to turn in the direction of the tension spiral because there is no material beyond the end in that direction to resist rotation. In the direction of the compression spiral, however, this is not the case because rotation is opposed by the compressive resistance of half the length of the shaft.

Longitudinal compressions are, therefore, greatest at the end reducing to zero at mid length while longitudinal tension which balance the compressions prevent the reverse law of summation, zero at the end and a maximum at mid section (constant torsion being assumed or under discussion). The shaft, therefore, never fails at the end but by tension at the mid length of constant torsion.

Zones of tension and compression are determined as follows: Because the tendency of shear distortion is to induce tensions and compressions at 45° and because the restraint of twist about a radial element interferes the element by its elasticity balances the twisting couple so that its departure from the 45° direction is the least possible by dividing it equally into + and — rotational resistances whose neutral plane will be at the center of area of stress strain torsion diagram or .7071R from the axis of the shaft in which R is the radius.

The vital importance of a clear understanding of the simple torsion problem cannot be too strongly emphasized since the laws of shear deformation and resistance are embodied therein.

Recapitulation twist shifts shear reducing the bending moment by the relative amount of the shift in all cases of transverse stress combining torsion and flexure. Twist invariably involves a reverse summation of tension and compression incident thereto, therein differing from beam action of simple flexure.

Combined torsion and flexure. As simple torsion was selected as the simplest example of a state of elastic stress so combined torsion for like reason is selected for discussion as the most elementary simple example of flexure because the torsional laws predominate in its mode of operation and render its precise discussion far simpler than the case of an ordinary beam. While the round and square plates are analyzed by identically the same methods the circular plate supported around its periphery because of its symmetry will be here discussed.

(Familiarity on the part of the reader with the elementary relations of contours to principal stress lines and lines of zero shear and the determination of reactions, thereby, as treated in Chapter IX, Concrete Steel Constr. Turner and Eddy, is assumed for the abridgement of the present discussion.)

By symmetry under either a uniform or concentrated load the twisting shears like those on the transverse cross-section of a shaft are symmetrical spirals but of different pitch.

While the shear spiral becomes tangent to a diameter in 180° in torsion of a shaft it becomes tangent in 90° in the circular plate because a sector of 90° is all that can bend about Y along X.

To construct the spiral shear lines, divide the radius into four equal parts and the 90° by four radials 22½° apart. The radials are zero shear lines and circles drawn through the equi spaced radial divisions are contours of location fixing by their intersection with the radials consecutive points a unit apart for determining and fixing the spiral curve.

Spiral intersections between the contours of location will be contous of equal differences of stress and equal differences of deflection of the plate under load.

Radial stresses of tension and compression as in a beam sum up from the support to the center but circumferential tensions and compressions present the typical reverse law of summation characteristic of torsion. In the shaft longitudinal tension is zero at the end and increases to a maximum at the center while longitudinal compressions are greatest at the end and decrease to zero at the center of length.

So in the plate circumferential tensions are zero at the support and increase to a maximum at the center. Circumferential compression on the contrary are a maximum at the support and decrease to zero at the center.

This reverse law of summation so radically different from beam action economically brings into action the material near the support which cannot be accomplished in cylinderical or beamlike bending and accounts for finding in the concrete mushroom slab only one-eighth of the energy of deformation stored in the steel against five-eighths in an ordinary concrete beam.

As in the shaft coordinate vertical twisting about radial axes and horizontal twisting about vertical axes occurs simultaneously. The twist about the vertical axis twists the neutral plane upward to a position one-third of the depth below the top at the center and down to the bottom at the support so that the plate acts much like a dome.

The lines of equi potential deformation in the compression zone are right and left spiral curves having the same pitch as the spirals of torsion of a shaft. In the tension zone the right and left spirals are orthogonal to these curves. A glance at these orthogonal spirals of equipotential gives a clear conception of the manner by which circular and radial resiliance becomes equal a fact long since demonstrated mathematically. The manner of construction of the deflection curves shows that this particular fourth degree curve, when drawn on a suitable scale is nothing more than a spiral having twice the pitch of the shear spiral. In other words, it makes a 45° turn in 90° and like the vertical shear curve in the beam to be discussed later is discontinuous as a spiral.

The foregoing views are so different from those entertained by our Joint Committee and the majority of writers on the subject of elasticity that a few simple experiments may be suggested to establish their concordant agreement with natural law.

A thin circular plate of celluloid supported about its edge loaded with concentrated load at the center will buckle when the load exceeds a certain amount. Twisting about a horizontal axis then causes the plate to hump up and shift the shear of the load from the buckled portion to adjacent material and the reaction to other points along the support. Exactly how the plate works may be exhibited by slitting with a fine saw radial lines one third of the distance from the support to the center then load the plate. It will bend downward easily until the faces of the saw cuts come into contact when it will suddenly present an enormous increase in rigidity because under this condition the compression is distributed with an approximate uniformity over the vertical section at the end so that the cut plate, if we may term it such, can resist a greater load than the thin plate of full section in bending.

Again, to establish the proposition of shifted shears and reduction of bending moment, take a square celluloid plate and support it on a square frame. Load it centrally and a slight rise from the support of the corners will be observed. It will then operate as a true plate by radial and circumferential resistance combined until the twisting caused by the increased intensity of the load so increases the compression along the support that it buckles as a long column. Contours or principal stress lines become scallop shaped and at their points of inflection or change of curvature present zero intensity of circumferential stress. With circumferential resistance eliminated the radial or beam resistance is increased by the corrugation of the plate but the deflection suffers, nevertheless, a sudden increase. Shift of shear is a phenomena analogous to the shift of the shear longitudinally in a shaft. It requires a certain ratio of depth or thickness to span length in order that buckling may not occur.

Writers on the mathematical theory of elasticity have undertaken to determine the flexure of a plate on the false assumption that the neutral plane of the plate was in the center and for that reason they erroneously present a different theory for a thick plate than for a thin plate although one and the same theory explains the diverse phenomena presented by each.

Continuing our experiment we find that the curve of flexure is the same for a concentrated load as for a uniform load in the circular plate because the shear lines can assume but one form and location. Hence, the deflection of the circular plate is strictly in proportion to the applied moment atipodal to beam action.

This is approximately but not exactly true of the square plate supported at its edge.

Comparing now relative stiffness of the same square plates supported at two parallel edges and on four under the same central load we find over four times the stiffness when supported on four edges that appear when supported on two and over three times the stiffness under the same uniform load than it presents under concentrated central load of the same amount.

In the dark ages when the constructor could not figure the stresses he constructed ingenious models on a proportional scale and thereby determined roughly correct principles and wrought out great cathedrals.

Today our structural committees, while advanced a few centimeters in theory have lost kilometers of ingenuity as evidence by the failure of our joint committee in fifteen years to discover the kindergarten principles of plate action although the reduction in bending moment by applied twist was taught in Thomson and Taite's Natural Philosophy two generations ago.

Twisting of a square shaft. While the lines of shear contours and deformations of a square shaft when twisted are of academic interest rather than of practical value to the structural engineer, nevertheless, such a problem best illustrates the theory of torsion applied to other than circular plates. An example of such a shaft has been drawn (Fig. 3). The lines of zero shear will be at once recognized by those who have read (Chapter IX, Turner and Eddy Treatise on Concrete) and the method of drawing the lines of shear will be readily followed. The bulge and depression of consecutive octants give rise to the beautiful contour lines first recognized by St. Venant and approximately plotted from his mathematical equations. His equations, as may be noted by reference to the figure reproduced in the article of elasticity in the Encyclopedia Brittiania or in Todhunter's work do not differentiate between the contours of bulge and depression nor indicate the curvature of the side of the shaft while the graphic method discloses this divergence in curvature and the relative distortion of the side as well as the end. The outline of the zone of tension assumes the form of a circle flattened at the extremities of the axes X and Y and quite pointed at the extremities of the 45° diagonal axes. A study of this figure will indicate the method by which a square plate supported on beams may be precisely analyzed and the column supported flat plate as well.

The error of Pierson (Volume II) in suggesting a modification of the equations of St. Venant of involving the divergence in spiral pitch in the square from the round shaft appears from the diagram.

It may not be amiss at this point to call attention to the remarkable conclusion of St. Venant that transverse bending of a prism represents a mechanism of stress lines unaltered in species of curvature by any alteration of the position of the applied loads. The principal stresses of a beam under concentrated load are of identically the same form of curve as the principal stress curves in the same beam under uniformly distributed

load and likewise the shear curves. The sole difference brought about by the different distribution of loading is a slight change, hardly noticeable, in the curvature of a neutral plane; a small longitudinal shift in the location of coordinated curves of greatest shear and principal stress in their intercepts on the boundary and neutral planes which measure slope deflection and stress intensity.

This conclusion deduced from his complex equations was not, of course, stated in this precise form although the gist of his conclusions covered the matter fully except as to the change in curvature of the neutral plane which his investigation was too complex and involved to clearly disclose as does the graphic method now to be described.

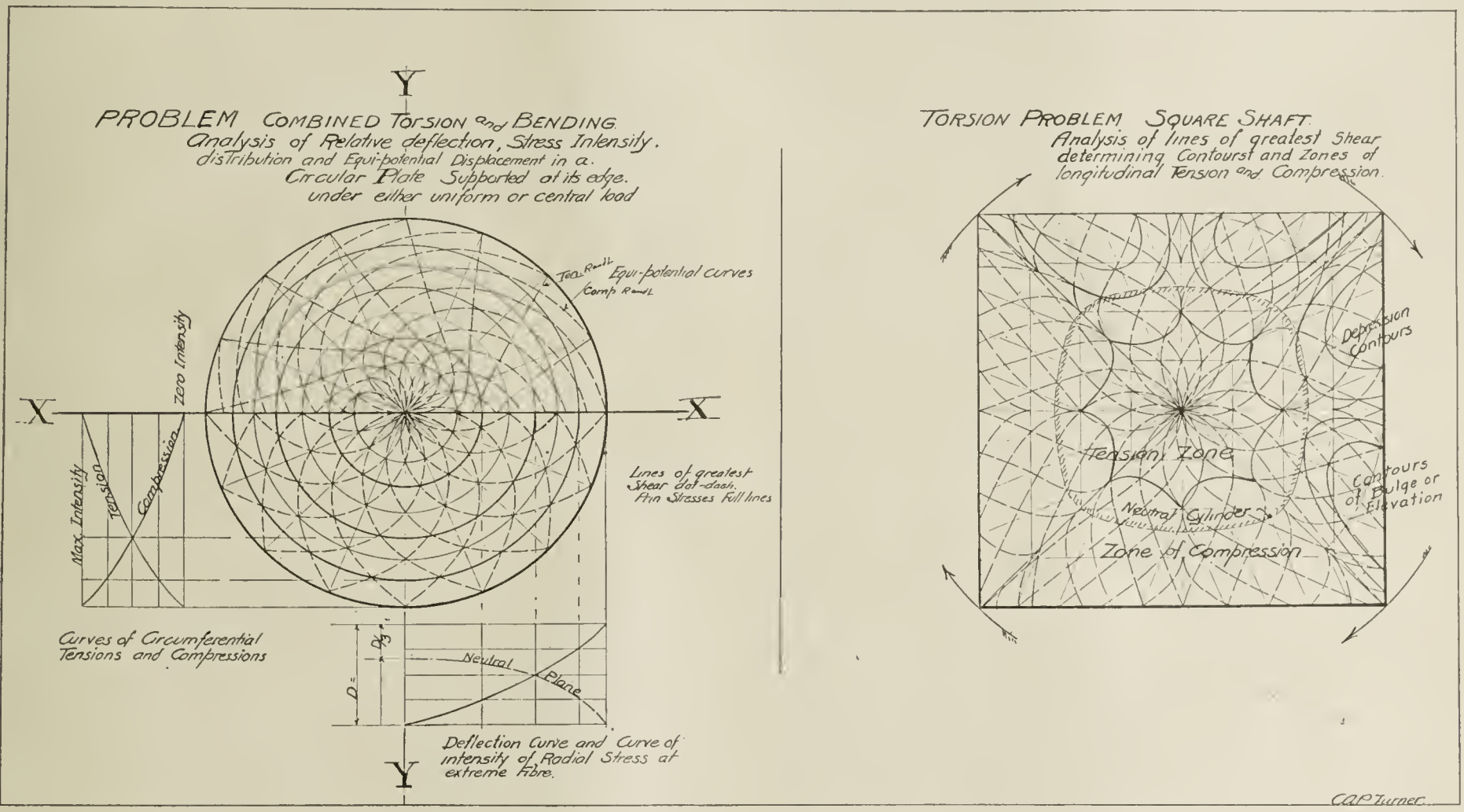
Transverse stress as illustrated by a simple rectangular beam is resisted by longitudinal compressions of the upper fibers and longitudinal tension of the lower fibers of intensity following the linear law on a normal section at mid span. Where the fiber stress changes sign, i.e. from compression to tension is called the Neutral Surface, neutral plane will be a parabolic curve identical with a slope curve (whose ordinates are proportional to the sum of moment increment areas from mid span to end) construed on bC′ as a base.

The neutral plane may thus bend without changing in length which it cannot do and fulfill the definition governing its location as the surface where tension and compression balance and along which shears only operate.

Extension of the linear law. Shears parallel to the neutral plane follow the linear law as do fiber stresses on all planes normal to the neutral surface because that surface as a slope curve by the parallelogram law reduces the increments of shear parallel to itself to the linear law of increase and likewise fiber stress perpendicular to any plane normal to the neutral surface.

Coordination of stress lines. As different elevations are disclosed by contours on maps so may contours of equal difference of deflection of angular slope and of stress intensity appear upon our stress diagram.

The method lies in equality of fiber stress strain and



commonly, but erroneously assumed to lie at the center of gravity or center of depth throughout the length of the beam.

To locate the neutral surface, let Fig. 1 represent a half elevation of the beam: at the right the fiber stress strain area is drawn and the tension and compression areas are divided geometrically into four equal parts and the centers of compression and tension areas are thus found.

Because the sum of the compressions and tensions can operate as a couple resisting bending only through their equilibration by horizontal shears we draw the shear stress area parabolic in form at the left. Divide the plus and minus areas each into four equal parts from which the centers of shear stress area appear. Equilibrate the centers of shear and fiber stress areas by the parallelogram principle as in the diagram at the left and the downward displacement of the neutral surface at once appears as half the vertical distance between the centers of their respective areas below the center of the beam at the end where it is lettered n.

With a concentrated central load (case analyzed) the shear strain areas by which vertical ordinates are marked off in equal units by projecting these divisions as construction lines across our elevation.

Mark the points of intersection of a′c with the horizontals (from the points of equal division of the fiber areas) f, g, and h, erect therefrom verticals s′s′, s″s″, and s‴s‴.

These verticals by construction represent equal divisions of the slope areas or equal angular changes in slope from which we may construct coordinated curves of greatest shear.

Resisting sections. Fiber stresses in each zone are resisted by the area ½bd. Shears parallel to the neutral plane balance the fiber stress and are resisted by the sectional area ½bL. Shears normal to the neutral plane are equal to those parallel thereto and are confined within the resisting section ½bd. Therefore, the horizontal section resisting horizontal shear curve is to the horizontal resisting section opposing the vertical shear as $\frac{L}{d}$ measured along the neutral plane, L being the length, b the breadth and d the depth.

The meaning of this equation in relation to a short and long beam may be illustrated by plotting these curves on a wide rubber band representing the section in elevation of the short beam, then stretch to double length and the same curves in their elongated relation on the stretched band are correct for the long beam of the increased length and reduced depth.

As the direction and intensity of the principal stress curves are determined by the shears this proportional relation between the long and short beam extends to the principal stresses also.

While the relative projected lengths upon the neutral plane of the horizontal and vertical shear curves are determined as above it is necessary to correlate this proportionate relation to the length and depth of the beam for useful application. This may be accomplished as follows: Shear acts at a direction of 45° to the center of the application of the shearing force. From the shear area diagram we find the center of the applied stress areas producing horizontal shear distortion. Now the center of the shear area as may be computed as .638 from the top of the beam and its intercept at 45° from the top or bottom surfaces would be ½d x .638. To construct the vertical shear curve, we now have its projected length upon the neutral plane, its intercept on the boundary planes and its two tangents, the vertical tangent being located at lines dividing equal slope areas marking each quarter division of the whole shears at s′s′, s″s″, etc. From the summation of equations of beam theory this curve is of the fourth degree (see Chapter VII, Concrete Steel Construction). To fix the additional point necessary to determine it we may refer to the general curves of our torsion problem. The curves presented are straight lines, circles and spirals and the spiral is the curve which fits. To locate the additional point necessary to determine the curvature project the apex of the curve on a horizontal line whose heighth is that of the intercept of the neutral plane. Draw a 45° line as a radius therefrom and lay off ⅔ the height of the apex above the intercept of the neutral plane and this point will be a point between the extremities which with the tangents determine the curvature desired.

Horizontal shear curves appear as circles of constant radius. As its horizontal run is a constant from the relation of resisting sections the radius is also constant, the depression of the neutral plane causing a slight deviation or twist from the regular curve as the boundary is reached (a relation better understood by constructing the curve graphically by the tedious summation method of Chapter VII, Concrete Steel Construction).

Principal stresses. Having determined the lines of principal shear to determine the lines of principal stress.

Their intercepts at points 1, 2, 3, and 4 on the neutral plane to the top and bottom, respectively, are first determined by laying off d/4 from s′s′-s″s″, etc. the relation of the vertical shear resisting section to the horizontal shear resisting section. Draw from these points construction lines (1-1″), (2-2″), (3-3′), (4-4′) and their intercept with the horizontals marking equal fiber stress areas will be the coordinates required for the principal compressions in the zone of compression, and the principal tensions in the tension zone. Orthogonal intersections fix the continuation of these curves into opposite zones and shear lines also assist.

Deflections are determined by contour intersections of principal stress lines above and below points 1, 2, 3 and 4. Extreme fiber stress curve is determined by projecting as contour points m′, m″, and m‴.

From the drawing it appears that the extreme fiber stress curve representing the deflection caused by moment is not as steep though proportional to the deflection curve the angular divergence marking the ratio of the total deflection as the result of shear deformation to that portion produced by fiber stress only.

Were it not for the fact that material beyond R is required to take up the end shear s‴m‴ + s‴′n‴′ would equal the horizontal divergence of equal divisions of the summation of moment areas and the summation of slope areas.

Deformations. Diamond shaped deformation results from shear distortion. Trapezoidal deformation from fiber stresses resisting moment. Like the tensions and compressions in a shaft these deformations present the reverse order of summation. Trapezoidal deformations increase from the end toward the center, diamond shaped deformations from the center toward the end. Each in its relative magnitude can be readily deduced from the map of stress lines.

For concentrated loading the diagram shows the actual fiber stress at the quarter point is 25% greater than that figured by the ordinary theory and formula $f = \frac{Mc}{I}$ while it is trifle less at mid span.

Continuous beam. Duplicate, reverse and turn the diagram ends abutting and, seemingly, we should have the diagram for a centrally loaded restrained beam of double length but at the point of centra-flexure the neutral plane would be discontinuous which could not be true. Interference of shear detrusion would be the phenomena presented and by this interference the excess detrusion in the compression zone of the cantilever thrusts against the lower part of the suspended span portion, thereby, reducing the tension of the lower fiber at mid span and the tension of the upper fiber over the support. The neutral plane is thus brought to the center of gravity at the points of inflection and assumes an arched curvature with resisting arch action superimposed upon that of pure flexure—a unit in harmony with that deduced by the application of the principles of rigidity (Chapter XIII, Concrete Steel Construction, Eddy & Turner).

The deviation is large in the deep beam but of less importance the greater the relative span.

Lines of stress in concrete beams. In this problem the shears operate in a radically different manner. That the supposed similarity to the lines of stress in the homogeneous beam are entirely lacking and whereas in the mushroom plate shears and principal stress are readily interchanged with little modification of the mode of operation, such is not the case in the unnatural and relatively unscientific combination of concrete and metal in the beam. Their coordination is such that for perfectly elastic deportment of both the steel and the concrete deflections cannot follow linear proportionality with respect to the load intensity but are an increasing function following the curve of a sector of the hyperbolic spiral.

Law of shear deformation in cantilever beams follows that of the simple beam reversed. Diamond shaped or shear distortion increases from the support toward the end and yet in the formulas for shear for wind stress in tall building not a few of the profession endeavor to reverse natural law and the deportment of these structures might readily be as sinful as the bridge that fell down did they suffer the wind pressures they are presumed to have been designed to resist. An unpleasant sway and vicarious cracking of concrete finished floors in upper stories is a common result of this improper assumption.

The general theory of building code rules providing for shear distortion may be summed in the statement that because the authors of the rules know nothing of the nature of the deformation they take no chances and provide for it whether present or absent. Thus, the same

provision for the mysterious element shear is made at the support of the restrained beam where diamond shaped distortion is absent that is required in the simple beam where it is actively in evidence.

Little wonder, indeed, when the so-called standard hand books on mechanics of materials present such fantastic figures of internal stress lines (see Merriman's Fig. 109, page 274, Mechanics of Materials) that it would be impossible to tell what the deformation was or its law of summation to say nothing of plotting curves of equi potential displacement.

Development of mechanical intelligence. Euclid, the great geometer taught the unique principle that useful measure of mechanical intellect was directly proportional to the numerical product of its length, breadth and depth, in other words, as its volumetric content. How accurate, indeed, was his conclusion is shown by the most abundant evidence in all lines of human endeavor.

The laborious and customarily unsuccessful efforts of the Federal Judiciary to correctly determine the scientific questions of structural mechanics in the patent suit is directly to the point.

With great length of schooling in the Adjective law of proceedure and great breadth of learning in the precise logic of theoretical equity, nevertheless, their familiarity with the natural laws of mechanical action is so shallow that the volumetric measure of their useful mechanical intelligence like that of a plane approaches so closely to the vanishing point that it is difficult to detect a trace of its existence by the most careful analysis of seven out of ten decisions of record in the Federal Reporter dealing with problems of structural engineering.

As the sphere presents the maximum volume for the minimum linear extent, the need in the promotion of engineering education by more uniform triaxial development is apparent.

If the young and growing generation of concrete specialists are taught Joint Committee rules at such great length with corresponding breadth of building code laws as presented in Hool and Johnson's, otherwise, excellent compilation with as little coordination with natural law and mechanical principles we greatly fear they will suffer what astrologists of heredity term a reversion of type—the contraction of their cerebellums to the meager dimensions of those of our forebears of aeons ago the authropomorphous apes of Darwinian mythology.

The pitiful result of biaxial technological development is illustrated by the lord of the research fellowship of the University of Illinois in certification in a patent case of his belief that there could be no relation between the internal work of deformation and external work of the load because he had never been able to measure such relation with his extensometer.

May we not, each and all, profit by serious study of the lines of the Raphael of artistic expression, the Hercules of dynamic scientific criticism abridged as follows:

Most men have the seeds of Judgment we find,
To check the erring reasoning of misguided mind,
Nature affords this glimmering light,
Whose lines touched faintly are still drawn right.
But as the slightest sketch, if rightly traced
Is by ill coloring the more disgraced,
So by false learning is good sense defaced.
What the weak head with strongest bias rules,
Is pride in false learning, the vice of fools,
Pride where wit fails, steps into its defense
And fills the mighty void of sense.
If once right reason drives that cloud away
Truth breaks upon us with resistless day,
While from the bounded level of our mind
Short views we take nor see the lengths behind,
But more advanced, behold, with strange surprise
New distant scenes of endless science rise.

—*Pope.*

This quotation from Pope should teach the engineer, be he young or old, that schooling and study will never raise him to such a mental altitude that he can learn nothing from the average workman on the job. He may then discover that their hearty cooperation is the strongest assurance of the creditable completion of any great understanding.

Progress of Sand-Lime Brick Industry in 1920

The sand-line brick industry made progress in 1920, according to a report soon to be issued by the United States Geological Survey, Department of the Interior, prepared by Jefferson Middleton.

This industry, like other building-material industries, was handicapped by shortage and inefficiency of labor, transportation difficulties, and the high cost of building. With the resumption of building operations the use of this product should increase rapidly, as it seems to be firmly established in public favor in many localities. Trade in 1920 was generally reported good during the first nine months of the year but very dull after that, due in part no doubt to business and in part to seasonal conditions.

The output in 1920 was 169,761,000 brick, as compared with 146,947,000 in 1919, an increase of 16 per cent. The value of this output in 1920 was $2,490,283, compared with $1,705,163 in 1919, an increase of 46 per cent. The output in 1920 was 73 per cent greater than that of 1918, but 9 per cent less than that of 1917. The value of the sand-line brick marketed in 1920 reached its maximum and was greater than that of 1918 by 182 per cent, and that of 1917 by 75 per cent. As compared with the output in 1913 that of 1920 decreased 10 per cent, and the value increased 101 per cent.

Seventeen States reported the production of sand-line brick in 1920. Michigan, as for many years, was the leading State in production and value. Its output was 39,280,000 brick, valued at $640,744, or 23 per cent of the total output and 26 per eent of the total value. These amounts represen a decrease of 7 per cent in output but an increase of 26 per cent in value, as compared with those in 1919. Minnesota. the second State, reported 24,891,000 brick, valued at $290,394, or 15 per cent of the total output and 12 per cent of the value, an increase of 6 per cent in output and of 21 per cent in value. Wisconsin ranked third in output and fourth in value, Florida fourth in output and third in value, and New oYrk fifth in output and value. These five States reported 64 per cent of the output and 63 per cent of the value. The other States that reported sand-lime brick were California, Georgia, Indiana, Louisiana, Massachusetts, North Dakota, Ohio, Pennsylvania, South Dakota, Texas, Washington, and the District of Columbia.

The number of operators who reported sales of sand-lime brick in 1920 was 37, the smallest number since 1903, except in 1919, when it was 35.

Practically all this material, 99 per cent, was marketed as common brick, and 1 per cent as face brick. The average price per thousand for common brick in 1920 was $14.61, and for face brick $19.48, as compared with $11.58 and $13.29, respectively, in 1919.

The Three Forks Cement Mill

We have at various times described in this publication aerial tramways that we have installed for use at cement plants. The installation at the plant of the Three Forks Portland Cement Company, Hanover, Montana, that we describe and illustrate in this issue is a little unusual, inasmuch as it is rather longer than the average tramway as used in the cement industry. There is also quite a drop in elevation between the quarry and the cement plant, which necessitated the use of a very strong traction rope.

The equipment includes 1⅜-in. and ⅞-in. diameter cables, and ⅞-in diameter wire rope. There are ninety 10-cu. ft. capacity carriers of the self-dumping style.

Between the terminal stations are two tension stations and 31 towers.

We repeat below a description of this plant in general, as furnished us by the officials of this company.

Plant "B" of the Three Forks Portland Cement Company, located at Hanover, Montana, was built in 1917-18. The factory, modern in every respect, is located nine miles from Lewistown ,on the Great Northern and Milwaukee railroads, and the property supplies all raw materials necessary for the manufacture of Portland cement: i. e., limestone, shale and gypsum. With the exception of the limestone, these materials are advantageously located, the shale and gypsum deposits being within 100 yds. of the lower crushing plant. The limestone deposit being on a mountain top some two and a half mile north of the mill, presented a more difficult transportation problem. The installation of an aerial tramway was the successful solution.

From the limerock quarry to the lower terminal it is 12,500 ft. by tramline over rough, steep country, with a variance of 1,650 ft.

At the quarry the rock passes through a 72-in. jaw crusher, and the tram transports the material as it leaves the crusher, each bucket carrying 1,000 lbs. of rock varying in size from 6 in. to dust. The lower tram terminal discharges the loads into bins feeding a gyratory crusher for further reduction before entering the mill.

The tramway has a capacity of 50 tons per hour. The workmen ride to and from the quarry in the buckets in comfort and safety and any supplies needed are freighted up in the same manner.

The plant has a daily capacity of 1,000 barrels and uses the wet process, with modern equipment throughout.

The total cost of carrying the rock over the tramway for the two miles from quarry to mill averaged 14c per ton. As the plant during this period operated only intermittently, even this low cost is higher than it would be under normal conditions.

General view of Three Forks Portland Cement mill. At left tramway is seen entering discharge terminal.

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Substitution cannot take place if you specify and insist upon "Williamsport," the quality wire rope.

This is the first and only time, and the only way a relayed or warehouse shipment of wire rope can positively be guaranteed to contain the wire rope you specify, without an exhaustive laboratory test.

Even the maker cannot tell the difference by looking at it. How then can you be expected to know whether or not a substitution has taken place? How do you know, if you have ordered "Plow steel" that you are not getting "Extra strong crucible cast"

(one grade and one price lower) and being billed with Plow steel?

These things can all happen to your disadvantage—and do happen in many instances.

All this can now be prevented by specifying and insisting upon "Williamsport." Thus, "Williamsport" has taken the greatest advance step in the history of the wire rope industry. They have settled for all time the problems of the purchaser in determining the quality of the wire rope he buys—

Until now he has bought upon faith alone. He has often been forced to risk lives, in the acceptance of wire rope, the grade of which he was not sure. He has wondered if he was getting the grade he bought, but no means were available for him to make certain of it.

Now there can be no need for expensive laboratories and costly engineering departments to test "Williamsport" grades of rope. All this is done for you and the tests are more exacting than any one laboratory in the world, for it is not sufficient for "Williamsport" wire rope to pass the critical inspection and exhaustive tests of one great laboratory; every step in the manufacture is subjected to competitive test of several of America's best laboratories—a more exacting test, we believe, than that given to any other make of wire rope in the world.

Write today for your Telfax color chart—and an interesting booklet on "Modern Wire Rope."

How to Measure Your Drilling Results

From a standpoint of drilling big blast holes, the formations of no two quarry ledges present exactly the same problems. Forty feet drilled per ten hours in one body of stone may be a remarkable record, while in another it may be only an ordinary daily average and capable of improvement. Such variations are due to many factors, too numerous to set forth here, but in the new Blast Hole Drill Catalog just issued by the Sanderson Cyclone Drill Company, Orrville, Ohio, you will find them analyzed in detail.

You quarrymen who like to do your own figuring and draw your own conclusions will find that this catalog offers a basis of accurately judging matters pertaining to big hole drilling. It is a good reference book.

A copy of this catalog (B-46) will be sent to anyone engaged, or interested in quarry operation, without cost or obligation.

Two mile aerial wire rope tramway for conveying limestone from quarry to Three Forks cement plant. A general view of this line looking toward loading terminal on mountain top is here shown.

Publication Costs Still Remain High

(Editor's Note: Some advertisers have wondered why advertising rates in class, trade and technical publications have not been reduced, along with general commodity prices. The reasons are many and far-reaching, but perhaps the best is that most publications, in the face of increased production expense, have increased circulation and are giving their advertisers a bigger money's worth than ever before. The following statement of the situation, taken from a letter written on the subject by Mr. Neal to an inquiring advertiser, is interesting to all buyers of space in indicating some of the production problems with which publishers are confronted today.'

Publishers are able to control almost none of the principal cost factors in the production of their papers. Until recently, the principal publishing centers of the country were upset by a priners' srike, involving demands for shorter hours and higher wages. In some instances, the unions were strong enough to compel the acceptance of their terms.* In other places the fight is still going on, at considerable added expense to the publishers.

*The 44-hour week was adopted in Chicago.

Too often the publisher is the helpless victim in these labor fights, because few business papers own or control printing plants. Too often, also, the employing printers weakly accede to the demands of labor unions, knowing that they can pass the added costs on to the publishers.

You advertising managers are also buyers of printing, and you need only to compare the prices you are paying today with those you paid before the war for the same kind of work, to appreciate the position of the publishers. A comparison of this kind would reveal that publishers have absorbed a goodly percentage of increased printing costs, even many of them are finding it difficult to break even from issue to issue.

Of course, you will say that paper has come down, and this reminds us that publishers took their medicine —and a bitter dose it was—when the price of paper soared to unheard-of heights, and charged the same old advertising rates. Paper prices have declined since that feverish period, but publishers still have to pay 7 cents a pound or more for No. 1 Super, and this price applies only upon carload lots sold on contract. Before the war, publishers paid 3½ cents or 4 cents a pound for the same grade of paper, so that even at the reduced price, our members are paying nearly 100 per cent more for paper than in 1914.

Another big item of cost is second-class postage, and last July the rate was boosted another notch, under the provisions of the zone postal law, so that publishers now pay as high as 10 cents a pound for mailing their papers into the eighth zone. We wish it were possible to convince Uncle Sam that information ought not to travel on a mileage ticket, but we have to consider conditions as they are.

Perhaps you, too, have to buy engravings, and you know what has happened in that case. Certain classes of engravings now cost nearly three times what they did six or seven years ago. The publishers in New York State spent a great deal of effort last winter to get legislation through the New York Assembly which would protect advertisers, as well as publishers, from undue exactions on the part of engravers.

One of the two tension stations that are on the aerial wire rope tramway line; plant of Three Rivers Cement Plant.

Perhaps you do not know that the publishing business has been harder hit by the Federal tax law than any other business in the country. This is due to the fact that only a small percentage of the value of a publishing business is in what the Government regards as "tangible" assets. The great bulk of the value is in so-called good-will. The Government has not permitted the publishers to return anything like a fair amount of invested capital, and consequently they have had to pay enormous taxes, as compared with other industries. Publisher after publisher has reported paying Federal taxes which amounted to 50 percent of the net receipts, and these were not big publishers, either.

Perhaps the fundamental mistake which is made by advertising men is to compare the trend of prices on general commodities with the trend of advertising rates. During the war, the prices of general commodities went up by leaps and bounds weekly, daily and

sometimes hourly, while advertising rates were made for at least a year at a time, and the average increase made all of our publications during the war period and the year following amounted to 27 per cent in the rate per thousand.

During the war your company would not accept orders for deferred delivery except on the basis of the prevailing market price. Publishers could not buy paper except on the same basis, and yet these same publishers had to sell their advertising space at guaranteed prices running over a full year. In no respect were the publishers in the same position as the manufacturers of commodities.

You cannot deflate what never was inflated, and this is the precise condition with reference to advertising rates.

During the war we were told that the whole future of advertising depended upon the maintenance of steady, stable, assured rates over long periods of time. The peculiar nature of our business did not permit advertising rates to fluctuate upward with every tick of the stock ticker, as did other commodities, nor do conditions now permit a violent fluctuation downward. We took the bitter with the sweet during the uncertain period of the war, and advertisers must do the same now.

I have before me Babson's report, dated September 5, giving the price index number covering the wholesale prices of more than three hundred commodities during the month of July. This indicates that it was 148, based upon 1913 levels.

A survey which was made last January of advertising rates in business papers showed that the index number as applied to advertising rates of our papers was 127 per thousand circulation, compared with 1913 levels.

You see, therefore, that with all of the reductions which have been made in general commodities, advertising rates today are still lower in comparison with the pre-war basis than general commodities.

Perhaps we should have followed the lead of manufacturers of general commodities during the war and boosted advertising rates up to two or three times what we did, and then we, too, could have made heavy reductions and still be getting a higher rate than we are today.

Moreover, since the war, there has been a sharp advance in the demand for editorial service in the most important industrial fields, and publishers today are putting much additional money into editorial features.

The only way in which any publisher can reduce rates today is to cut into the vital and essential item of cost, which would mean less circulation among a poorer class of readers, and a marked deterioration in editorial standards. This certainly would be short-sighted economy from the standpoint of advertisers, for your power of expression is limited and controlled by the efficiency of the advertising tools you must use.

Agricultural Limestone

The Shelby County Farmers Co-operative Limestone Development Association, Shelbyville, Mo., have erected a modern up-to-date agricultural limestone plant, the machinery for which was furnished by the Universal Crusher Company, Cedar Rapids, Iowa. They have installed a late model Universal pulverizer and crusher combination outfit.

Cost of Excavation is Prime Factor of Interest to Engineers, Contractors and Highway Officials

Since the time of building the Pyramids, the cost of excavation has been one of the prime factors of interest to the engineering profession. The fundamentals must be premised on the economical handling of earth work.

Not so many years ago the cost of labor ran as low as $1.00 per day, and a man would excavate with pick and shovel, four to eight cubic yards per day, and under these conditions, it was deemed advisable to use labor and not machinery. Times have changed, however, and today we pay labor $4.00 to $6.00 and consider ourselves quite fortunate if we can get a man to handle three or four cubic yards of material. Therefore, it is essential that engineers interested in contract work consider the cost of handling earth work by all known methods, so that they will be in position to recommend the most economical method for a given condition.

Rock Drilling Equipment

When rock is so hard that it cannot be loosened by the steam shovel, it becomes necessary to employ other means, namely, by drilling and blasting. Hand drilling, on account of the present high cost of labor, I would not consider unless the amount of yardage is very small. We will assume the necessity of a drilling outfit.

"I have found the Sullivan rotator to be a most efficient tool, together with the portable gasoline air compressor. We have in use on our work in Pennsylvania, a Sullivan compressor with a capacity of 150 ft. of free air against 100 lbs., 28 H. P. We are using three Sullivan rotator drills. Holes up to 14 ft. are drilled without any trouble. It is very portable, and the whole outfit can be placed on an automobile truck and moved to another job very easily. We find that the drills are excellent for side hill work where set-ups would be quite difficult for tripod drills. Holes can be drilled parallel and on line with the slope, thus giving a good finished job without tearing down too much of the rock outside of the pay line. For shallow work, for side hill work and for thorough cuts up to 14 ft. we find that the Sullivan rotator gives us excellent results, says a well known eastern Superintendent of Construction, State Highway Department.

"In thorough cut work, I have noted the use of tripod or piston drills and well drills of the Sanderson-Cyclone type. The tripod drill while being very effective, etc., is quite difficult to set up on side hill work. There is much time lost hammering the bit when the drill sticks, and much time lost cleaning the holes, etc.

"Well drills of the Sanderson-Cyclone type, on account of the large charges of powder, very often shake down material outside of the pay line. In a great many cases a path must be made for the drill carriage so that it can be moved along in a horizontal position. I believe that many contractors when they become familiar with the possibilities of the Sullivan rotator will prefer this tool to all others."

Building the New Davenport Cement Mill

The Western States Portland Cement Company, Independence, Kansas, owns 350 acres of land a few miles outside of Davenport and is opening a quarry and building a new plant. The property contains rock and shale, materials needed in the manufacture of high grade cement, in close proximity—exactly where they are wanted, in fact. From 14 to 20 per cent of shale will be used with the limestone.

A plant is being erected there which will have a capacity of 4,000 barrels of cement a day. At the time the photographs shown herewith were taken the steel frame of a large machine shop and store house was well along. This was the first permanent building on the ground. A temporary crushing plant was in place, with the exception of a railroad incline for the dump cars. This temporary crusher was for use in the work of construction, giving way later to a larger and permanent crushing plant.

A quarry was opened by stripping off the dirt and shale. For this preliminary work a locomotive crane and two steam shovels, have been used, loading into Western six-yard, standard-gauge dump cars. When the work of production begins next year, the first operation of the quarry will be against a 40-foot face. At the time the photographs were taken, the track led out of the pit on a five per cent grade. Only one loaded car at a time could be pulled up this grade by the light locomotives which, for the time being, were used.

Fourteen dump cars, handled this stripping in two trains, the trains being taken a short distance around to the other side of the yards where a shallow fill was being made to bring the low ground up to the grade desired for the yard-tracks. Readers will be especially interested in two features of this work—the dumping and an experiment in shifting track.

The cars are successfully dumped from a level, as is shown in one of the illustrations. After the dumping, the dirt is leveled with a spreader and the track shifted. An attempt was made for a time to shift the track by means of an ordinary pump puller. A long cable was anchored securely to "dead men," at intervals of about 50 feet, paralleling the track. An attachment from the track could be hooked over the cable anywhere. Two hitches were used on the track, about 15 feet apart. The ties were first jacked up out of the mud and then the stump puller hitched on. It was necessary to regauge the track occasionally but the labor saved by this operation seemed for a time to be enormous. The practice had to be discontinued, however, on account of the bending of the 70-pound rail where the hitch was made.

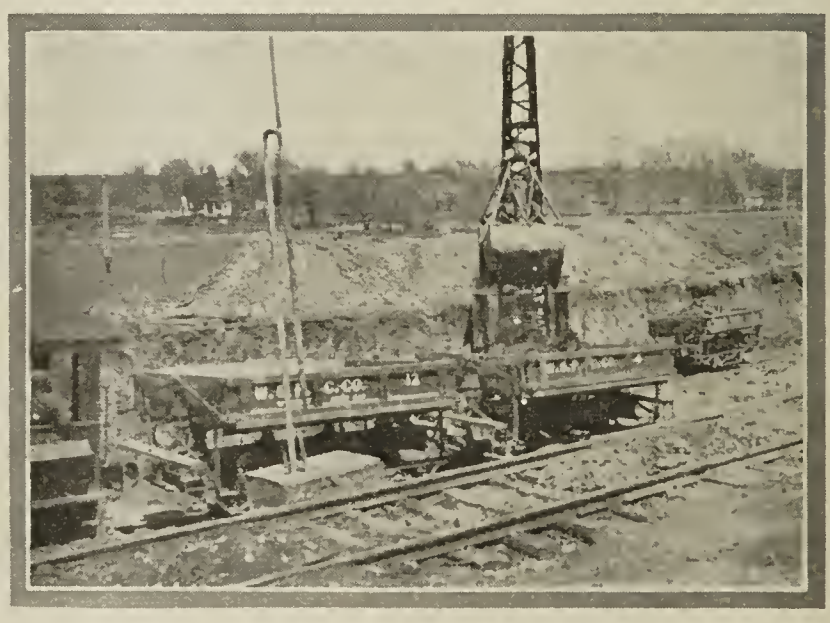
The new plant will be a wet process mill. The shale and rock will be ground in water and the material will come from the machines, with a consistency of paint. It is claimed that this process secures a better mixture

Making a shallow fill near Davenport, Iowa. This train of western 6-yd. dump cars has just dumped its load from a level and is pulling out.

It surely avoids the dust, which is characteristic of most cement mills.

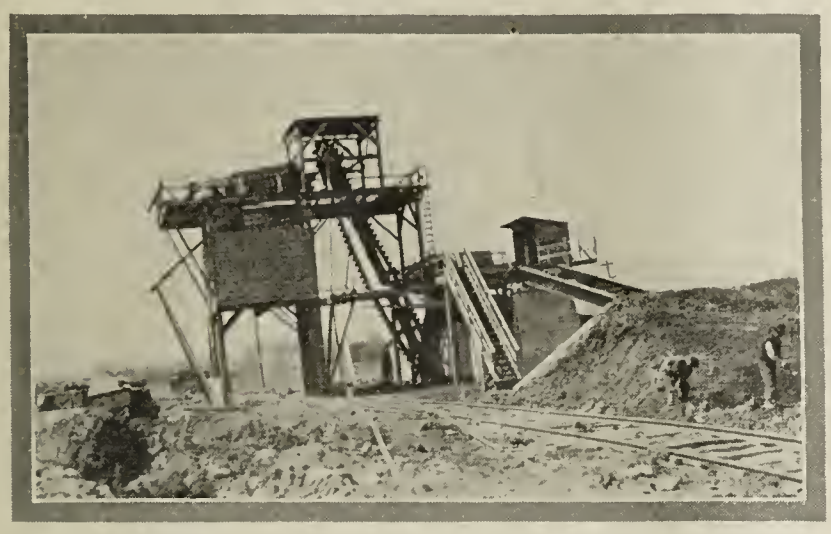
"We will sack and sell the dust which ordinarily blows away," explained the superintendent.

This up-to-date plant will be electrically operated and will generate its own power, using three 1,000-horsepower oil-burning Diesel engines. Water will be pumped from the Mississippi river, a half mile distant, by electrically-driven pumps. The company owns a mile of river front, with excellent wharfage facilities available, which can be utilized in moving cement when river traffic develops. There are rail connec-



Temporary operation for opening the quarry, getting ready to "cut in" a steamshovel. Loading western 6-yd. dump cars. The car on the right carries coal for the shovel.

tions with the C. D. & M., an interurban line; the C. B. & Q.; C. M. & St. P., and C. & R. I. Railroads. The cement storage tanks and sack house will straddle the loading track.



Temporary crushing plant, Western States Portland Cement Company.

Mr. A. W. Shulthis of Independence, Kansas, is president and Mr. J. P. Rucker of Independence, secretary of the Western States Portland Cement Company. Mr. A. D. Stancliff is general superintendent at the new plant.

Reducing Blasting Costs

A new booklet entitled "Volume vs. Weight", just off the press, is being sent out by the Hercules Powder Co., Wilmington, Delaware.

This booklet presents a phase of the explosive question which the average user very seldom conisders. However, it is an important point and should not be overlooked because in many cases the use of bulky explosives, such as Special No. 1 or Hercomite, will show a considerable saving over costs obtained by using the regular grades of dynamite.

Everyone interested in reducing blasting costs should read it.

Any of our readers may secure a copy of this booklet free, by writing to the Advertising Department, Hercules Powder Company, Wilmington, Delaware.

The Makers of Cement

By Lester T. Sunderland, President Portland Cement Association.

Trade or industrial associations arise in response to definite needs; they are a product of the processes of economic evolution. Broadly speaking, they come under two classifications: (1) The modern "Open Competition" associations, which have for their aim the more intelligent conduct of business in the commercial competitive field, based upon orderly and systematic ascertainment and dissemination of existing related facts, and (2) the "Scientific-Educational-Promotional" associations, which have for their aim increased knowledge, usefulness and use of the products of the industry represented, without concern in the commercial competitive field.

The Portland Cement Association, which originated in Philadelphia in 1902, comes under Classification 2. It is not commercialized in the usual sense of the word, and is neither concerned in the direct sale and distribution of cement, nor in the trading relationships between its membership and their patrons.

Because of its simplicity of use, adaptability and enduring nature, probably no factory-made basic structural material occupies such a broad field of usefulness as does cement, or offers such promising opportunity for expansion of its uses. Recognition of these facts is primarily responsible for the existence of the Portland Cement Association, which is supported by manufacturers in the United States, Canada, Cuba, Mexico, Uruguay and Argentina.

Many products and processes of great benefit to humanity have failed to achieve the full recognition and use to which their worth entitled them, because accurate knowledge of their value and utility was not intelligently sought and widely disseminated. It is only in recent years, since advertising under the pressure of competition developed into a true art, that producers have bought, by alliance of their forces, to effect a widespread knowledge of the utility of their products, and wherever the intrinsic value to mankind of the product has equaled the claims made for it markets have expanded, production has increased and a great service has been rendered the public.

The results already achieved by this association indicate clearly the great opportunity to secure that substantial trade expansion which lies in unified effort in the research-educational-promotional field, without in any degree sacrificing that element of wholesome trade rivalry so essential in the interest of public welfare. Were it not for the work this association has been doing for nearly twenty years the public would still be largely without knowledge of the usefulness and adaptability of concrete, which is now a prime basic necessity in the forward march and progress of modern civilization. * * *

This association recognizes its responsibility to the public, as is evidenced by the constant effort it puts forth to prevent abuse or misuse of cement, correlated with its endeavors to advance its proper use. Through the research work of its structural materials research laboratory, which is maintained jointly and in cooperation with the Lewis Institute, Chicago, new knowledge is being attained as to how cement should not be used, as well as to how it should be used. Our most capable and conscientious architects, engineers and contractors rely increasingly upon this association for "concrete" facts; and through these professions the best interests of private owners, municipalities, and tax payers generally are served and protected.

* * *

To know the possibilities of cement as disclosed by systematic and methodical research, to spread broadcast through association literature and advertising, these findings for the benefit of mankind in order that concrete (in which cement is the basal ingredient) shall give the greatest service possible—in brief, to improve and extend the uses of concrete, are the objects and aims of the Portland Cement Association.

In the association's scheme of organization and policies the ideal of democracy is its guiding principle; any cement manufacturer may belong to it, no cement manufacturer need belong to it. Each member, without reference to size, has but one vote in helping to establish and promote its policies.

It is through the principles and practices adhered to in the conduct of this association's work that its members express: (1) Recognition of their responsibility to the public; (2) Faith in the utility of their product; and (3) belief in the value and necessity of research-educational-promotional work as a developer of their markets.

A Modern Tennessee Screening and Washing Gravel Plant

Before the completion of the new and modern screening, washing and storage plant the Kinzel-Thompson Sand & Gravel Co. operated a small screen equipment mounted on a river barge. The barge screening in conjunction with a small crushing plant on the river bank, was entirely inadequate and the up-keep and maintenance costs were altogether out of proportion with the productive results.

The proposition which was adopted after careful study, was to erect a modern screening and washing plant in the company's storage yards at Knoxville. The scheme as it was adopted was to dig the aggregate from the deposits with a clam-shell bucket and load into barges. The barges are then transported to the unloading wharf of the plant and the material is delivered to the screening machinery, as described later in this article.

The various units which comprise this screening plant are as follows:

One 24-inch steel apron feeder, 16-feet centers.

One 24-inch belt conveyor 170-feet centers, operating between the hopper at the banks of the river and the washing plant.

Two 84-inch conical screens.

One No. 5 crusher elevator, 56-feet centers.

One steel settling tank.

Five special unloading gates for handling the material from the washing bins to the cars.

The storage plant consists of the following units:

One 20-inch belt conveyor 140-feet centers, from the washing bins to the center of the storage pile.

One 20-inch inclined belt conveyor 54-feet centers, which delivers the material to the shuttle belt conveyor.

One 20-inch shuttle belt conveyor 125-feet centers, for distributing the material to the storage pile.

One 20-inch reclaiming belt conveyor 290-feet centers, for receiving material from the storage pile.

One No. 5 crusher elevator 76-feet centers, which delivers material to special concrete storage bins for loading into wagons or cars.

The aggregate is taken from the Tennessee River about one-half mile above the company's wharf. The material is dug by means of clam-shell buckets mounted on a derrick boat. It is then loaded onto barges and transported to the company's wharf. At the wharf it is taken from the barges by a stationary derrick fitted with a clam-shell bucket. The material is dropped into a hopper and is elevated to the top of the washing bins by means of an inclined bucket elevator.

It is at this point that the aggregate is discharged into revolving screens, where it is thoroughly washed and sized. In the first screen the material over two inches is rejected and is spouted direct to the Symons disc crusher. The crushed stone is then elevated back to the head screen and goes through the regular process.

Three sizes of stone are produced: 1½-inch to 2-inch; ⅞-inch to 1½-inch, and ¼-inch to ⅞-inch. Three grades of sand are separated; a very coarse concrete sand, a brick sand and a fine sand for asphalt use.

As the fine material comes from the last screen, it is plunged against a tapered screen, which diverts the coarse sand, the finer material passing through this screen and being delivered to the settling tanks. The first settling tank is adjusted to separate the medium class of sand. The overflow from this tank is directed into the second settling tank, which separates the finer product.

In this way all the very fine sand and silt is saved. As the various sizes are separated, they are dropped into the storage bins below and these bins have a capacity of from 250 to 300 tons each.

The surplus which cannot be delivered to the washing bins is transported to the storage system, which has a capacity of approximately 52,000 cubic yards. The storage of the surplus material is accomplished by means of a shuttle conveyor. This conveyor is 20 inches wide and 125 feet centers. It is reversible so that the material can be discharged over a total length of the storage pile of approximately twice the length of the shuttle conveyor proper, which approaches about 250 feet.

On the slow moving head shaft of the conveyor is mounted a cast iron capstan, which is used for propelling the shuttle in either direction. To move the conveyor it is only necessary to snub the rope about this capstan and permit the power of the machine to pull the conveyor to any desired point.

Underneath the storage pile is constructed a concrete tunnel and in this tunnel reclaiming belt conveyor operates, which is 20 inches wide and approximately 290 feet centers. Swinging quadrant type gates are located directly over the conveyor for drawing the material from the storage pile above.

In order that the stone be uniformly and correctly loaded onto the belt, a traveling loading hopper is furnished. This hopper is constructed with a truck frame which spans the belt conveyor. It is equipped with rail locks permitting of fastening the hopper in position under any desired gate.

The reclaiming conveyor delivers material to an inclined bucket elevator 76 feet centers. This elevator delivers to concrete storage bins which are used for loading the material into street cars for delivering by rail. By diverting the material into the head end of the elevator, it can also be delivered into a second set of bins used for loading railroad cars.

Mr. Fred L. Conner is president of the Kinzel-Thompson Sand & Gravel Company and has been largely responsible for its rapid growth. Mr. P. S. Todd is vice president and general manager.

1921 Edition Testing Materials

The 1921 edition of the book of the American Society for Testing Materials Standards, is now off the press. It is issued triennially and comprises 890 pages, and contains 160 Standards as follows:

61 relating to Steel and Wrought Iron.
7 relating to Pig and Cast Iron and Finished Castings.
31 relating to Non-Ferrous Metals.
18 relating to Cement, Lime, Gypsum and Clay Products.
10 relating to Preservative Coatings and Lubricants.
19 relating to Road Materials.
4 relating to Coal and Coke.
6 relating to Timber and Timber Preservatives.
2 relating to Rubber.
2 relating to Miscellaneous subjects.

The Standards of the American Society for Testing Materials are recognized as authoritative in the field of engineering materials. The volume is available at the price of $10 in cloth binding and $11.50 in half-leather binding. Address American Society for Testing Materials, 1315 Spruce St., Philadelphia.

Two Views of
Kinzel-Thompson Sand & Gravel Co.

More Popular Than Ever

The Bradley Pulverizer Co., Allentown, Pa., announce that their plant is running (50) hours per week and that at no time during the last year have they found it necessary to go below this schedule and at present they contemplate increasing their working force materially due to the fact that they have recently secured some very fine contracts which will keep their plant up to its maximum capacity for several months to come. Inasmuch as most of this business comes from the cement industry and from agricultural limestone producers, they are pleased to report sales of installations to the following companies:

Giant Portland Cement Co., Egypt, Pa.
Dexter Portland Cement Co., Nazareth, Pa.
Universal Portland Cement Co., Pittsburgh, Pa.
Knickerbocker Portland Cement Co., Hudson, N. Y.
Watertown Stone Products Co., Watertown, N. Y.
Carbon Limestone Co., Youngstown, Ohio.
Coplay Cement Co., Coplay, Pa.

The Bradley Hercules Mills being used by these companies, again demonstrating their superiority.

In addition to the above they are figuring on a great many more installations and it is their firm belief that their business will be greater than ever within the next few months and that they will find it hard to meet the demand of the cement manufacturers.

The Bradley Hercules Mill is the largest semi-fine preliminary pulverizer on the market. It is in successdul use, grinding both dry and wet raw materials and cement clinker and on account of this uniformly ground semi-fine product it produces a material which greatly increases the output and efficiency of the tube mill used for final grinding and the combination of the Hercules Mill with the tube mill undoubtedly permits of the lowest cost of manufacture of either raw material or cement clinker.

Not only does it produce this material at a lower cost per barrel, but insures the operator of a uniformly fine ground product at all times and greatly helps towards producing a high grade portland cement.

The Bradley Hercules Mill shows a grand average in all plants located in most every section of the country of (40) tons per hour when grinding raw material to a fineness of 50-60% thru a 100 mesh. Not only is it exceptionally well suited for the manufacture of cement, but makes an ideal agricultural limestone pulverizer for the large producer. In grinding clinker, it has an output of (125) to (175) barrels per hour.

Their prices have been reduced to pre-war time in an effort to stimulate business and the Bradley Company report it is very pleasing to note how many of the cement companies have responded.

Studies on Cooling of Fresh Concrete in Freezing Weather

The practice of placing concrete in freezing weather renders important a knowledge of the rate at which this material will cool, and the effect of the various methods of protecting the freshly placed concrete from the cold.

The bulletin deals with certain experimental work carried on at the Engineering Experiment Station of the University of Illinois with the object of obtaining data on the length of time required for concrete of a given temperature to lose its heat and become cold enough to freeze when it is exposed to temperature lower than the freezing point of water. Some experiments were made on the protective effect of coverings.

While it is probable that these experiments do not give complete data regarding concreting in freezing weather under all possible conditions, it is considered that they throw some light on the behavior of fresh concrete at low temperatures, and indicate the necessity of protection or other precautions.

Copies of Bulletin No. 123 may be had without charge by addressing the Engineering Experiment Station, Urbana, Illinois.

Lime in Construction

In his new capacity as manager of the construction department of the National Lime Association, Mr. Peter C. Spence, will have supervision of the cooperative investigation of lime in construction uses, such as its effect on concrete, its fire resistance in plaster, the compostion of lime plaster for special uses, acoustic properties of lime plaster and other properties being conducted by the United States Bureau of Standards and with several other laboratories by the Association. Lime, which has long been the standard cementing and plastering material needs much special study to adapt its properties to the numerous new problems in building operations which have arisen in recent years by the introduction of concrete, hollow tile, metal lath machine mixers, automobile transportation of mortars and many other developments in building construction.

Concrete Ornamental Moulds

Never before in the history of concrete work has the use of concrete been so great for ornamental purposes as at the present time. There seems to be no limit to the possibilities in this line and concrete lends itself so readily to the manufacturer of ornamental articles that it proves most attractive and a very interesting line of work. There is a satisfaction about turning out a handsome piece of work that appeals to every concrete worker, and the profits in this line

are also very satisfactory. You can make a vase similar to the following illustration with about one sack of cement. This vase would sell for not less than $10.00 and every house-wife wants a pair of these as soon as she sees them. This illustration show one of the most attractive and beautiful lawn vases on the market at the present time. The moulds for making these concrete vases are sold by the W. E. Dunn Mfg. Co., 414 Twenty-fourth Street, Holland, Mich.

Cement Company Constructs Flume for Water Power

The plant of Lehigh Portland Cement Co., at Metaline Falls, Wash., sometime ago were compelled to close down for nearly six months during which time they rebuilt the wooden flume that carries water for power purposes from Sullivan lake reservoir to the steel pipe line that leads to the company's powerhouse.

The old flume, which has been replaced by the new structure, had a length of 2½ miles, was on an insecure foundation that made it subject to damage and breaks by snow and rock slides. The new flume has been built over a route that eliminated several sharp curves, by which the length of flume was reduced to 2⅓ miles. It is 5 by 6 ft. in cross-section, and has a carrying capacity of 70 cu. ft., at a velocity of 3½ ft. per sec. The flume rests upon cross ties and stringers, supported by piling driven to solid footings.

In the construction of the flume, the boards forming the bed were laid on the cross ties, and the joints were filled with pitch and covered with strips of lumber; the end joints were calked with oakum and covered with strips of tin plate. Both wooden and tin strips were securely nailed down. The boards forming the sides were placed horizontally and nailed to the braced studding. The edges of the side boards were grooved and then joined by an insert of wood that fits into the grooves of the upper and lower boards. The joint thus made was calked with oakum and covered on the inside of the flume with strips of tin plate. The end joints of the side boards are calked and plated like those of the bottom boards.

Pile tressle being built.

This flume, from the lake intake to the point of discharge into a steel pipe, makes a descent of 11¼ ft. A part of the 2⅓ miles of the route was along a precipitous mountain-side where the hauling of lumber by ordinary wagon or motor truck was out of the question. So a way was devised for hauling the material over the top of the flume as fast as the structure was completed. This was accomplished by utilizing the power of the motorcycle. The bulk of the load rests

Driving piles to support wooden flume.

upon the rear axle of an ordinary lumber wagon; the front end of the load rests lightly upon the axle of a 3-wheeled motorcycle, the driver seated thereon to control the power and guide the machine.

The accompanying illustrations show phases and stages of work in the construction of this flume, which serves such an important function in the operation of a modern cement manufacturing plant.

In the drop of 460 ft. between the flume discharge and the powerhouse, this volume of water is carried by a 36-in. steel pipe, 580 ft. of which passes through a rock tunnel.

The powerhouse is equipped with two hydro-electric generating units of the capacity of 4000 hp. About half of this is required for operating the cement plant equipment. The town of Metaline and its business houses are supplied with light and power from this plant.

Prices of Sand and Gravel Reduced

Reduction of nearly 29 per cent in sand prices and about 25 per cent in prices of gravel have been announced by the Greenville Sand and Gravel Company, one of the largest concerns of its kind in Ohio and Michigan. This company filed with the state highway department a new schedule reducing sand prices to 50 cents from 70 cents per ton and gravel to 60 cents from 80 cents, with a five per cent discount for cash payments monthly.

News of the Cement Mills

The reason for the price cut to $2.50 a barrel as given out by L. B. Burch, assistant to the president of the Atlas Portland Cement Company, John R. Morron, is contained in the following statement:

"Important saving have been made by the Atlas Portland Cement Company in the cost of manufacturing its product. It has passed the benefit of these savings on to its customers. These savings have been effected by greater efficiency among the mill employes resulting in lower costs of production. Coal and other raw materials are cheaper. The company has reduced its Northampton and Hudson base twenty-five cents a barrel and its Hudson lighterage rate have been lowered from thirty cents to twenty-five cents. This has made possible a drop in price to the trade from $2.80 to $2.50.

A determined effort to re-finance the Choctaw Portland Cement Company is being made by P. G. Walker, Jr. Tulsa, Okla., president of the company who is now in New York and Washington negotiating with eastern capital with a view to putting new life into the company and probable resumption of operations, according to press reports.

In case the negotiations are successful, it is intended to add about $200,000 worth of new machinery and make the plant bigger and better than ever.

While the condition of the money market is said not to be very encouraging, yet Mr. Walker hopes to realize on his efforts.

As a result of the tests made on property about a quarter of a mile west of the corporate limits of Waco, Texas, the Southwestern Portland Cement Co., who have plants at Victorville, Calif. and El Paso, Texas (Carl Leonardt, H. W. Hellman Bldg. Los Angeles, Calif. is president of the company) have exercised their option and secured possession of the 258 acres, which have an inexhaustible supply of lime rock, suitable for the manufacture of portland cement. A plant will be erected thereon, according to press reports, costing not less than $3,000,000.

After being shut down for four months, throwing about 500 men out of employment, the Southwestern Portland Cement Company's plant in El Paso, Texas has resumed operation.

The Dixie Machinery Manufacturing Company, 3665 Market St., St. Louis, Mo. have equipped the new plant of the Pyramid Portland Cement Company, E. Struckmann, General Manager and Superintendent, Des Moines, Ia. with one of their No. 6 Mogul Dixie crushers to handle 300 tons per hour of 6 to 8 inch cubes from a jaw crusher to 2 inches and finer.

The Dixie Machinery Manufacturing Company started about two years ago by Edward H. Frickey, President, who was for 30 years connected with one of the largest crusher and pulverizer companies in the world and on leaving this firm started the Dixie Company with the intention of giving the public a swing hammer crusher that can be operated at a very low cost per ton of grinding. Mr. Frickey declares that the Dixie machine is superior to anything he has ever designed.

James C. Muir, General Manager of the Ho Hong Portland Cement Company, Singapore, S. S., under whose direction the plant was designed and erected, has returned to the United States and is now connected with the Robertson Cole Company, New York, who are the Ho Hong Company's New York agents and who supervised the purchasing and shipping of the entire plant.

The Hermitage Portland Cement Company is being organized to build a new cement plant having a daily capacity of 2,000 barrels, at Nashville, Tenn. The buildings are already completed, having been built for munition factories and were purchased of the Nashville Industrial Corporation.

The quarries will be located on the Old Hickory reservation, where two large limestone bodies have already been opened. Limestone can be had in unlimited quantity from the quarries which were opened during construction days to secure stone for road work and concrete construction. The quarries have been opened to such an extent as to develop the various strata of limestone and prove its existence in large quantities. A survey is now being made to ascertain the depth of the several strata and the character of the rock at various depths. Drill holes are being put down at various points and a very thorough examination of the property is being made. Clay deposits, located along the banks of the Cumberland will furnish sufficient clay. About 25 acres of clay beds and 100 acres of limestone will be taken over the cement plant, in addition to a 25-acre plant site.

During the last week a thorough examination of the limestone deposits at the plant was made by Wilbur Nelson, state geologist, for Tennessee and Ernest Burchard, of the United States Geological Survey. Both declared the limestone to be suitable for cement making and pronounced the quarry sites and plant equipment as being ideal for such a proposition. This report was also borne out by tests and investigations made by Mr. Miller, who has been connected with the cement industry for a great number of years.

The Southwestern Portland Cement Co. El Paso, Texas has installed one of the most modern waste heat recovery units to be found anywhere in the cement industry consisting of three boilers for generating steam from the waste heat gasses of the kiln. They have also recently completed a new crushing plant. The rock and shale are brought over the trestle and dumped into the preliminary crusher, which in this case is a 36x60-in. Fairmount roll, driven by a 150-hp. motor. The rock is reclaimed by a 60-in. pan conveyor running on a 45 degree inclination, which deposits in an open storage of 200 tons capacity. From here it drops onto a 5 ft. pan feeder running on a 10 degree inclination which deposits the material into a No. 7 Williams (Jumbo Type) mill for further reduction. From here it goes by a system of conveyors to the mills for grinding and then to the kilns for burning.

The Lehigh Portland Cement Company has filed a complaint with the Interstate Commerce Commission protesting that the freight rates on the transportation of cement from is mill at Iola, Kan., to destination points in Kansas, are discriminating against it, as com-

pared to rates charged from Hannibal, Mo., at which point the mill of the Atlas Portland Cement Company ships cement to the same destinations in Kansas. The Lehigh asks the commission to require establishment of non-discriminatory rates by the carriers on whose lines its mill is located—the Missouri Pacific railroad, Atchinson, Topeka & Santa Fe railway, and the Missouri, Kansas & Texas railway.

The $25,000 damage suit of Joseph J. Cook vs. Atlas Portland Cement company went to trial at Hannibal, Mo.

Cook, who is thirty-eight years old, is asking damages for personal injuries which he alleges to have received when he claims a Huntington mill was started up while he was at work on the inside of the mill. He claims that he will be permanently crippled from the injuries received.

The Universal Portland Cement Co. announces a reduction in its selling prices for Universal portland cement, effective September 15, of 20 cents per barrel at its Chicago plant and 15 cents per barrel at its Pittsburgh and Duluth plants. This is the second price reduction made by this company this year.

A ten per cent cut in wages was recently made in the plant of the Atlas Portland Cement Co. Hannibal, Mo.

The Lehigh Portland Cement Co. Metaline Falls, Wash., recently installed a new tramway from its quarries to the mill.

Several alterations have been made to the plant of the Hanover Portland Cement Co., Hanover, Ont. Limestone rock is now used instead of marl as one of the raw materials and the change has entailed the installation of additional machinery to grind the rock and take care of the increased output of the factory. The output of the mill has been increased from 70 to 1,200 barrels per day. In order to obtain this increase one 8x8-ft. ball mill driven by a 20-hp. Westinghouse squirrel cage motor, and one 5x22-ft. Bonnot tube mill driven by a 150-hp. motor, have been added to the wet raw grinding department, and one 8x8-ft. ball mill driven by a 200-hp. motor, has been added to the clinker grinding department. Mitchell electric vibrating screens have been installed in the raw, clinker and coal mills. Tunnels with belts and elevators have been built under the rock and clinker storages to facilitate handling these materials, and all other elevators and conveyors have been changed. The plant has been rewired and the wires put in conduit. The crushed limestone is unloaded either into storage or into the mill bin directly from the cars by a 15-ton link-belt locomotive crane.

The Wolverine Portland Cement Company was incorporated in Michigan February 24, 1902, and with its plants at Coldwater and Quincy, Michigan, is in an advantageous position to supply materials for the great constructional demand of the state.

The financial structure of this company is very simple, consisting of $1,000,000 in common stock divided into 100,000 shares of $10 par. The balance sheet as at December 31, 1920, shows net tangible assets of $1,016,495, giving the common a book value of $10.16 a share. Current assets were $354,612 against $175,247 of current liabilities, the ratio being nearly two to one and indicating a working capital of $179,365.

The five-year analysis of income gives an interesting insight into the effects of unfavorable operating conditions on profits. In 1916, the last year of normal construction, earnings, after depreciation, were $115,011, equal to 11.5 per cent on the common stock, while deficits in 1918 and 1920 are attributable to transportation restrictions and tieups and coal and labor shortages.

The comparison follows:

Year	Net profits before depreciation	Net after depreciation & write offs	Per share of com.
1916	$ 177,239	$ 115,011	$ 1.15
1917	77,266	15,266	.15
1918	35,532	22,468*	.22*
1919	74,661	10,431	.10
1920	.....	119,318*	1.19*

*Deficit.

Earnings for the last few months of the current year have been reported at between $8,000 and $12,000 a month and officials of the company look forward to the close of 1921 as being a prosperous year for the company. Due to increased efficiency of labor and a better grade of coal, it is expected the output from the one mill now being operated will be equal to that of 1920, when the company operated both mills.

No dividends are being paid on this stock at present, but liberal disbursements have been made in the past, dividends as high as 26 per cent having been paid in one year. In the 19 years since incorporation, the company has distributed dividends aggregating 100 per cent, or an average of 5.3 per cent per annum.

George Roth, superintendent for the Pennsylvania Portland Cement Co., Nazareth, Pa., has moved to New York state to take charge of the company's recently acquired plant.

A. R. Frey has resigned his position as superintendent of the Gilmore Portland Cement Corporation, Gilmore City, Ia.

State cement commission will remove its office from Pierre to Rapid City, S. D., in the near future, in order that the commission may be near the base of operations. A. C. Hunt, of Rapid City, newly appointed member of the commission, stated it was planned to push the state plant to completion as early as possible so that it can supply the cement needs of South Dakota.

B. M. Updike, Box 1266 Memphis, Tenn., writes as follows: "I am organizing a company to go into the cement game. We are amalgamating a number of interests and would consider taking over a plant anywhere that could be converted into our use. We shall go into the crushed stone business along with the other. If you know of any plant or company having a plant that we could take over in our new one, I shall appreciate your able assistance. Would also consider taking over a stone-crushing plant."

In the clay pit of the Gulf States Portland Cement Co., Geo. P. Dieckmann, president, Demopolis, Ala., they are using the most up-to-date machine for cutting clay, which is known as the Adel clay excavator, with a daily capacity of 500 tons of clay. It requires a force of only three men to take care of this product. The machine shaves the clay from the sides of the pit at a depth of fifty feet, and carries a weighing hopper, from which it is transferred to the conveyor belt to the large Williams swing hammer crusher.

News of the Concrete Products Factories

One of the most interesting industries of Kewanee, Ill., is the Smith Concrete Products Company. This plant has an ideal setting between the C. B. & Q. tracks and the G. & K. Electric Railway.

Young trees growing about the factory and the spacious show grounds are beginning to show up and in the near future will present one of the most attractive places in this community. The name of the company is set out on a beautiful green background of grass, in large letters formed from groups of white stones. Samples of the products of the firm are shown at intervals over the grounds.

A. J. Smith is well versed in the art of concrete construction, and with a keen realization of human likes and dislikes. He has built up a fine business since coming here a little over a year ago and has a very promising enterprise. Previous to coming here, he was engaged in operating a similar plant at Buda, which is still maintained by him and managed by his sons.

Concrete products of any shape or form are possible to construct with the equipment that is kept at this factory. Several hundred forms, many of them adjustable, make possible any article of concrete known to the science, and in this age of concrete there are many possibilities of this material which people do not realize until they visit a plant such as Mr. Smith has built up.

The present factory building is 54 by 64 feet in dimensions, affording ample room for the storing of material, molds, work room and curing room. Various machines used in the business are also kept here. Plans which promise to materialize in the near future, allow for the building of one or more larger factory buildings for this company that will be 100 by 64 feet in dimensions, extending toward the city.

For the construction of residences, everything but the interior finishing and roof is possible to obtain at this plant. Starting with concrete block for the foundation and sides, a great selection of material for each nook and corner may be chosen, even to tile flooring and porch columns. An example of the elaborateness of the work done is shown in the columns which are made in any style, Roman, Grecian and Gothic, with the most beautiful designs of each. Floor tile is another nice feature of the work, different colored lozenge shaped sections are fitted together for floor either in or out of doors. These pieces are also made in any thickness.

Farm Buildings

Everything for concrete construction for the farm is possible to make, and Mr. Smith has had considerable experience in the construction of farm buildings. Concrete silos of blocks that are fastened together by a poured concrete wedge which locks them together, have given good satisfaction. Fence posts scientifically made reinforced so that they will not break is another product. They are made with a substantial anchor.

Sewer tile and various kinds of tile are made in various sizes. Absolutely every article that is made is tested for its durability and no article is put out that will not stand true.

Concrete pieces for decorations of lawns, parks or cemeteries are featured and some novel jars, vases and urns are on display in the yard. Some of these have varied colors that are worked into the flowered designs and besides being pretty to see are interesting for the way they are constructed.

Sizes, designs and colors of finish are varied in each article constructed. Possibly the greatest variety is in the finish of blocks, which are white, grey, cobbled, colored glass, micaspar and other colors, finished in panel, rough, plain and various other designs.

Of considerable interest to cement products manufacturers is the announcement by the Kent Machine Co., Kent, Ohio, builders of the well-known Kent Continuous Mixers, of a new motor-driven machine which they have added to their already complete line of mixers. It is generally known that the Kent Stationary Mixer is practically the only mixer on the market that was designed especially for use in concrete products plants. In keeping with their policy to supply the cement products manufacturers with the type of mixer that is best suited to their requirements, the Kent Machine Company designed the motor-driven mixer.

The output of the "Kent" is easily controlled and can be varied from nothing up to full capacity by merely shifting a lever. This is done without in any way changing the proportions of the mix. By this adjustment it is not necessary to mix more material than can be used almost at once, and everyone knows that the sooner concrete is placed in the molds after being mixed the higher the quality and strength of the product.

The Crookston Cement Products company, Crookston, Minn., manufacturers of tile, states that the factory is running at full capacity every day and there is great demand for all the manufactured products. The company is employing about 20 men at present.

Galien Concrete Tile Co., Galien, Mich., manufacture cement stave silos (Playford and New Monarch molds), cement blocks (Ideal machine and Anchor tamper), fence posts (staple molds). They operate Frank and Sheldon mixers. Interested in waterproofing compounds.

Lansing Silo Co., Lansing, Mich., operates Fair cement stave silo molds and a Stewart mixer.

C. Birch & Son, Leonidas, Mich., manufacture concrete burial vaults (Norwalk molds), concrete brick and posts. Wants prices and catalogs on vases, mica spar crystals, white sand and white cement.

U. S. Roofing Tile Co., Parkersburg, W. Va., are furnishing tiles for embellishing concrete work. Vitrified Clay tiles in a variety of red shades and a wide range of sizes for ornamenting concrete, for floors, wainscoat and roofs. Ask for sample tile.

Which do you manufacture, sightly or unsightly brick? Make poured concrete brick the kind of brick that are used for faced work. You can't get anywhere by calling a dry tamped brick a wet brick. To succeed you must have poured brick. I will gladly send you a circular explaining the difference between the poured and the dry tamped concrete products, writes Merrill Moore, Creston, Ia.

You can use the new low-freezing DU PONT STRAIGHT DYNAMITE in any weather without thawing

"This powder gave us excellent results.....as we found it was the only powder we had during the past winter, and especially during zero weather, which we did not have to thaw, it being in perfect condition at all times when we took it out of our large unheated magazine .....this is the type of powder we have long looked for."

(Excerpt from letter from a large user of explosives)

THE quick action, great shattering power and reliability of Du Pont Straight Dynamite has made it for many years the standard for many kinds of work. The new low-freezing Du Pont Straight, the result of years of work by Du Pont Chemical Engineers, retains all the finer qualities of the old "Straight" without its great disadvantage—high freezing point, requiring a time-wasting and dangerous thawing operation. The new Du Pont Straight can be used successfully without thawing in any weather. It is indeed "the type of powder we have long looked for."

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Wilmington, Delaware

KENT CONTINUOUS MIXER
for CONCRETE PRODUCTS PLANTS

Is your plant equipped with modern machinery that saves labor, holds down your pay roll, and turns out large quantities of QUALITY products at a low cost? You have not the proper equipment if you are mixing concrete with a machine designed in fact for another trade.

The Kent is especially designed for the needs of concrete products plants. It is low in cost, continuous in action, easy to keep in repair and it has a good clean record of 15 years in the industry.

Write today for Catalog No. 8

THE KENT MACHINE CO.
KENT, OHIO

—Here's a Booster Winter Proposition—

Here's a proposition you should be interested in. You can make money during the winter just as well as during the building season by manufacturing and selling the

Automatic Sealing Vault

Make them in our Bessemer Steel Molds, adjustable to seven sizes—making a perfect self-sealing vault that keeps the contents proof against air, moisture or vermin.

Write today for information regarding this Money-Making proposition.

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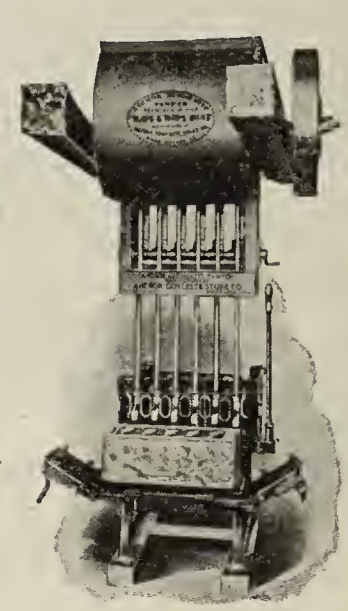

THE HOBBS

The multiple oval cores of a Hobbs machine make the use of wet mix possible with no loss of time. The result is a hard, dense, waterproof block—plain for foundations and cover walls—faced for superstructure.

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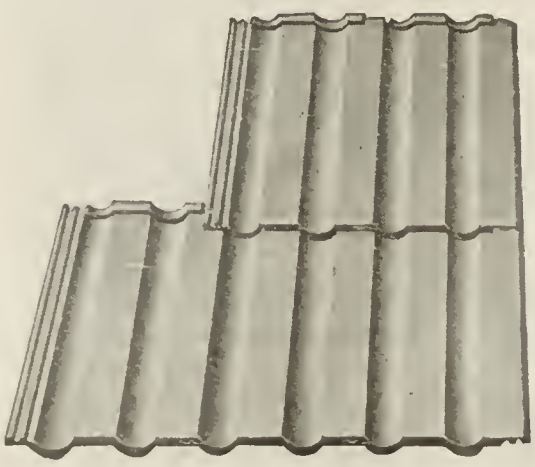

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Is a perfect and durable roofing. They firmly interlock and overlap one another in both ends and sides of the tile. A peculiar feature of our tiles only. They are carefully designed in a variety so complete that any roof can be finished beautifully with them. No matter how complicated it is.

For nearly 30 years our tile machinery has been in successful use. Its simplicity, lasting quality and unequaled capacity have created a very great demand for it everywhere when introduced.

Buy the U. S. Champion Tile Machines for making French and Spanish Tile. Their moderate price and superiority to any others will justify your purchase of them. Write us for description and prices.

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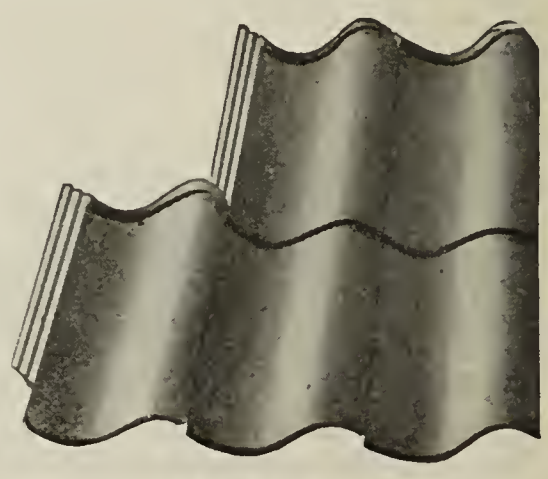

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This Booklet tells all about the machine and the business.
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Hundreds of Builders and Block and Brick Manufacturers all over the United States and Canada are making better profits with Helm Brick and Block machines.

Building permits have jumped by leaps and bounds in the last few weeks and the demand for concrete brick and block cannot be supplied. This spring is going to see an unequalled demand for high grade concrete products.

Start Now!

Put yourself in position to get your share of the business that is going to be done this spring. The first thing to do is to

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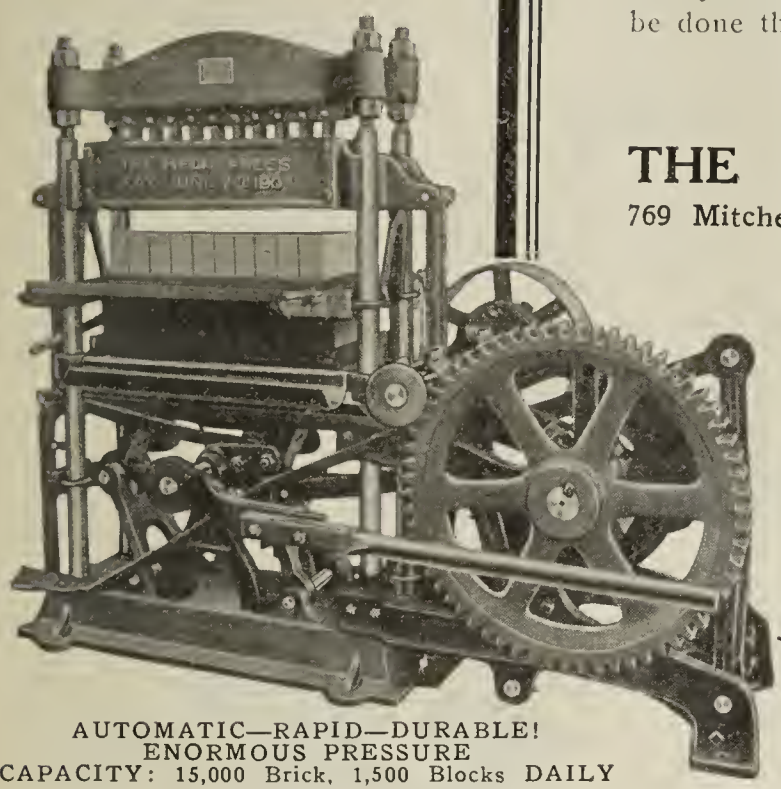
THE HELM BRICK MACHINE COMPANY
769 Mitchell Street — CADILLAC, MICHIGAN



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ENORMOUS PRESSURE
CAPACITY: 15,000 Brick, 1,500 Blocks DAILY

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Made in all sizes both hand and power machines

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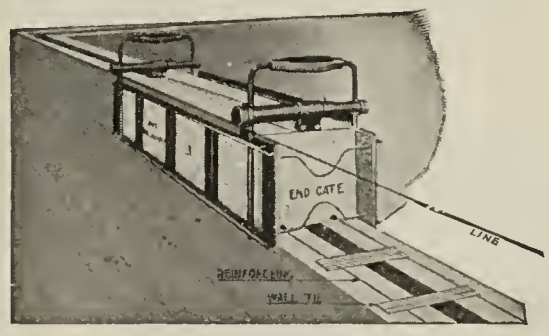

Like a thermos bottle—warmest in winter—coolest in summer. Fire-proof—everlasting.

Cheapest, best and most perfect way known to the building world.

The reason the most wall can be built for the least money with our forms is—because they are STRONGEST—LIGHTEST—SIMPLEST and MOST PERFECT, and the price of a complete set can be saved on one small job. Send for literature.

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Beautiful, Artistic and Everlasting

Made in six scientifically milled sizes, extremely hard, sharp and free from dust. Insures strength and beauty. Booklet "Micaspar and How to Use It," with free samples mailed on request.

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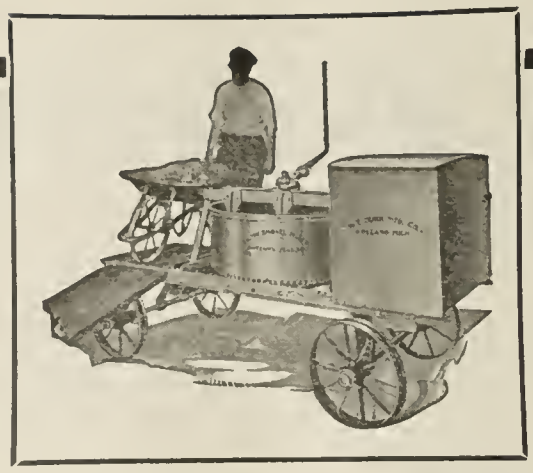

An all-round mixer for all-the-year-round work. Use it on all your concrete, mortar and plaster mixing jobs.

CONTRACTORS USE THIS MIXER ON THREE TIMES AS MANY JOBS

Portable Dunn Shovel Mixers are designed to mix mortar and plaster as well as concrete. They are built to do this work better than you ever had it done before. We want you to expect more service from it than from any other mixer. Don't be afraid of overworking it; keep it busy day after day on all of your mixing jobs. Even if you give it three times as much work to do as you would an ordinary mixer, it won't wear out any sooner.

You'll like the ease by which this mixer is charged, its rapid and convenient bottom discharge, the way it cleans itself, its compactness, portability, sturdiness and dependability. Because it will mix concrete, mortar and plaster and because of its many features, you really get three mixers for the price of one. And you pay no more for it than for an ordinary mixer. Try it out for a couple of weeks before you buy.

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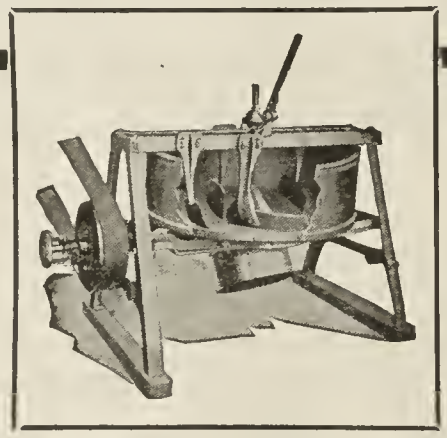


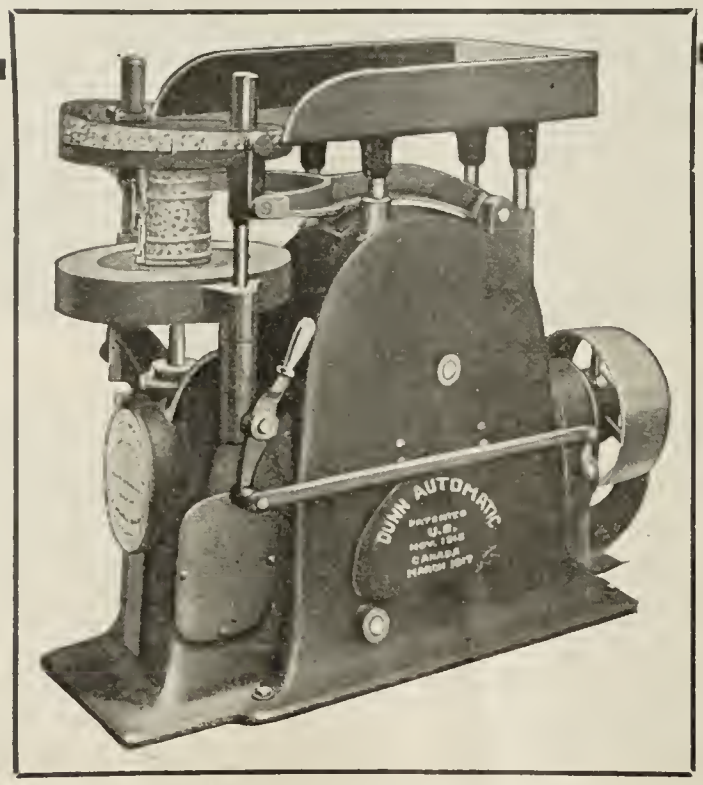
The Dunn Shovel Mixer produces a thoroughly mixed, plastic material because of its four shovels. A hundred times a minute the material is shoveled, stirred and troweled.

It not only saves the labor of one man, but it improves the quality of your products and increases your production. You may try it out before buying.

RUN YOUR PRODUCTS PLANT WITH ONE MAN LESS

With a stationary Dunn Shovel Mixer properly installed you can improve the quality of your products and increase your production with one man less than you are now employing. Simply because power and gravity are utilized to accomplish automatically what you are now doing by hand. The only labor involved in keeping your production machines, whatever they might be, constantly supplied with material is in loading a bucket below the floor level with the unmixed materials.

You'll be interested in knowing that the cost of this complete mixing and conveying equipment is less than that of the ordinary conveyor alone.



Write for Bulletin M-21

THE BUSINESS OF MAKING HOLLOW TILE

The immense demand and market for a more economical, more permanent building unit, such as hollow concrete tile, is readily evident in every community. Supplying this market means a permanent business bringing in large earnings.

It is a big part of our business to completely equip standardized plants for turning out this hollow tile and other products in large quantities at low cost. That we are able to establish you in a most profitable business is demonstrated by the success enjoyed by all Dunn Plant owners.

There's a whole lot to be said about this proposition which will interest you. Drop us a line for particulars.

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The World's Best 4 Cubic Foot Mixer

All Iron and Steel construction, with the EXCLUSIVE SIDE GEAR DRIVE, that adds 100% to its worth. Mixer loads or discharges from either side—always in gear when dumping. Strongly built—no wobbling.

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Saves 50% in Labor

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Just the right size for foundations and floors.

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Just right for culvert and county work.

Sold Under Iron-Clad Guarantee. Write for complete specifications and descriptive circulars. Dealers wanted everywhere.

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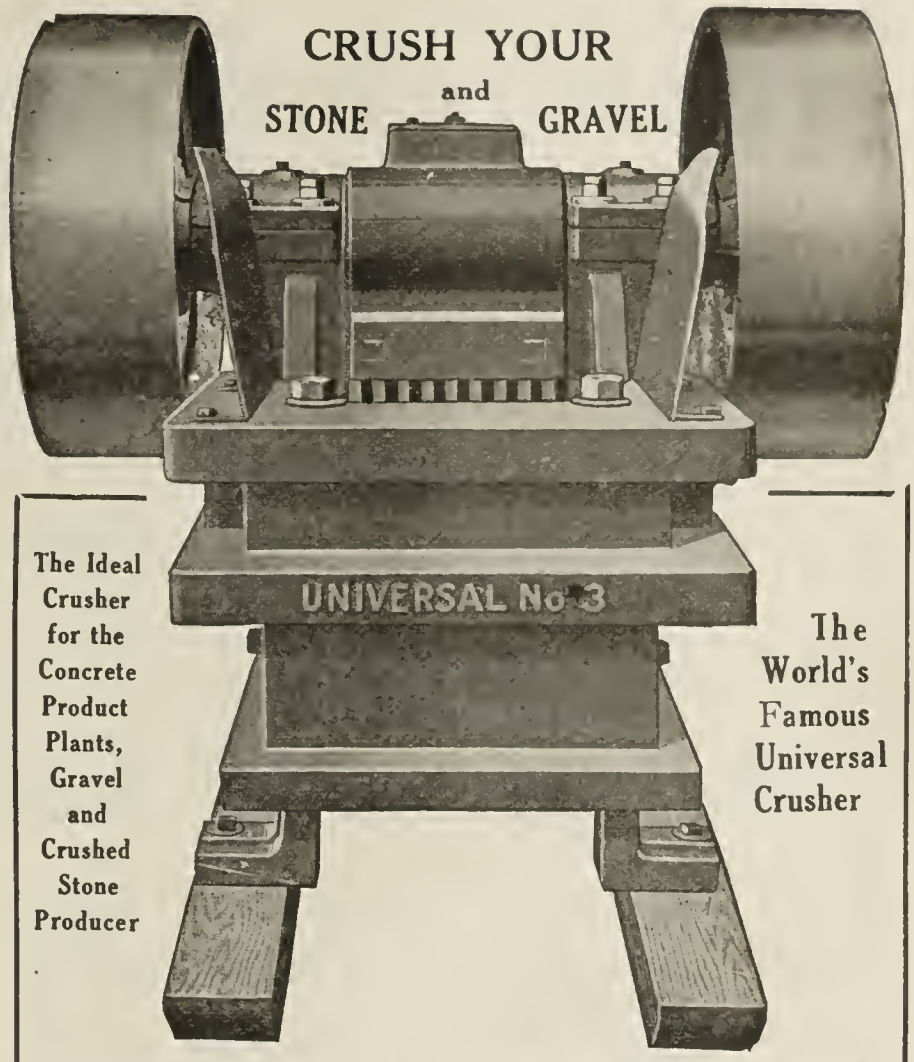
CRUSH YOUR STONE and GRAVEL



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We Build Crushers from 5 Tons to 300 Tons per 10-hour Capacity

Instantly adjusted to produce size required from ¼ inch to 3 inches. *Write for Folder No.* 14.

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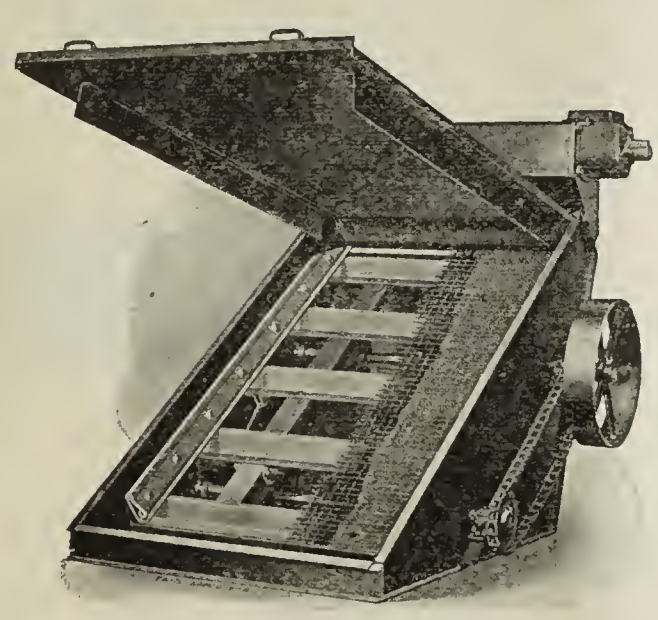
STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY



"Bucking Broncho" Separator

A plant that tries to screen without a "Bucking Broncho" has yet to know true screen efficiency.

A simple, durable, inclined screen, built upon principles never before attempted, and which has proved a remarkable success. It not only has all the vibratory motion of other screens, but also has many others, not heretofore utilized. It not only has the ordinary up and down motion, but has a further to and fro and lateral motion, as well as a rotating motion, together with many slaps, jars and shakes. This tremendous amount of vibration not only screens the material far better than any former device, but also considerably augments its capacity per square foot of screening surface.

Its screening surface is not stretched, yet it cannot sag even if one stands upon it, because it is held up by the coarse foundation wires, resting on the saddle.

CRUSHERS—GRANULATORS—GRINDERS—PULVERIZERS—
SCREENS—MIXERS—ELEVATORS—CONVEYORS—CHUTES

STURTEVANT MILL CO., BOSTON MASS.

HARRISON SQUARE

NEW YORK, SINGER BLDG. CHICAGO, PEOPLES GAS BLDG. PITTSBURGH, 1ST NAT'L BANK BLDG. ATLANTA, HEALEY BLDG.

THE POLK SYSTEM

All-Steel Machines for All Kinds of

Circular Concrete Construction

We contract grain storages.

Polk Genung Polk Company

521 Occidental Bldg.
Indianapolis, Ind.

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INDIANA

Henry Heil Chemical Company

210 to 214 South Fourth Street, ST. LOUIS, MO.

We make a specialty of
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Chemical Apparatus, Chemicals and Reagents

Gilmore's Needles, Cement Moulds, Vicat Apparatus,
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Specific Gravity Apparatus, Etc.

Pyrometers, Calorimeters

High Grade Goods Only

Satisfaction Guaranteed

Makes 5,760 building blocks a day

The Debay Completely Automatic Block Machine is a piece of equipment that can turn a struggling block plant into a prosperous manufacturing enterprise.

It is the only concrete block molding machine in the world that has rotating mold members with stationary core bars.

Hand labor is reduced to the minimum.

Keep the material hopper full and the finished 8x8x16" blocks flow from the machine on an endless belt in an endless stream at the rate of 12 every minute, 720 an hour, 5,760 a day.

The product includes standard 8 x 8 x 16" back-up, corner and end blocks in a wide variety of faces.

See it in the movies!

You can see the machine operating in a plant at Springdale, Pa., or we will show moving pictures of its operation in any community where interest is manifested in the proposition.

Write for details.

Debay Research & Mfg. Co., Springdale, Pa.

SELECTED WHITE SAND

UNEXCELLED FOR

Facing Concrete Blocks, Ornamental Concrete Stone, Hard Plaster, Finishing, Exterior Plastering, Roofing, Stone and Marble Sawing, etc.

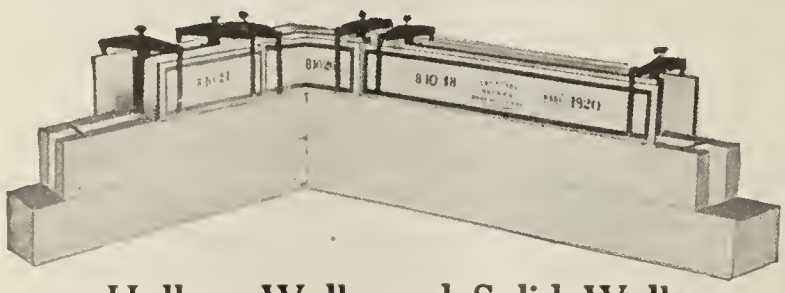
Prices, Freight Rates and Samples on Application

Shipped in Paper Lined Box Cars

Small Shipments in 175-lb. Bags

Ottawa Silica Company

OTTAWA, ILLINOIS



Hollow Walls and Solid Walls

These Forms build either kind. The Forms will owe you nothing after you have built the one job. **They are so Cheap.** They are strong and dependable forms and the lightest forms built. Don't break your back lifting forms from the wall. Let us prove these statements.

Send for our catalog

THOMPSON FORM & CLAMP CO.

Fond du Lac, Box 166 Wisconsin

PERFORATED SCREENS

Made to suit your requirements. Advise diameter, length, thickness and size of perforations required.

NORTMANN DUFFKE CO.

1220 27TH AVE.

MILWAUKEE - - WIS.

SAND PUMPS

That pay the largest dividends per dollar of investment.

"The Pump That Makes The Money."

This Pump is all that is implied in the name

LIGHTNING

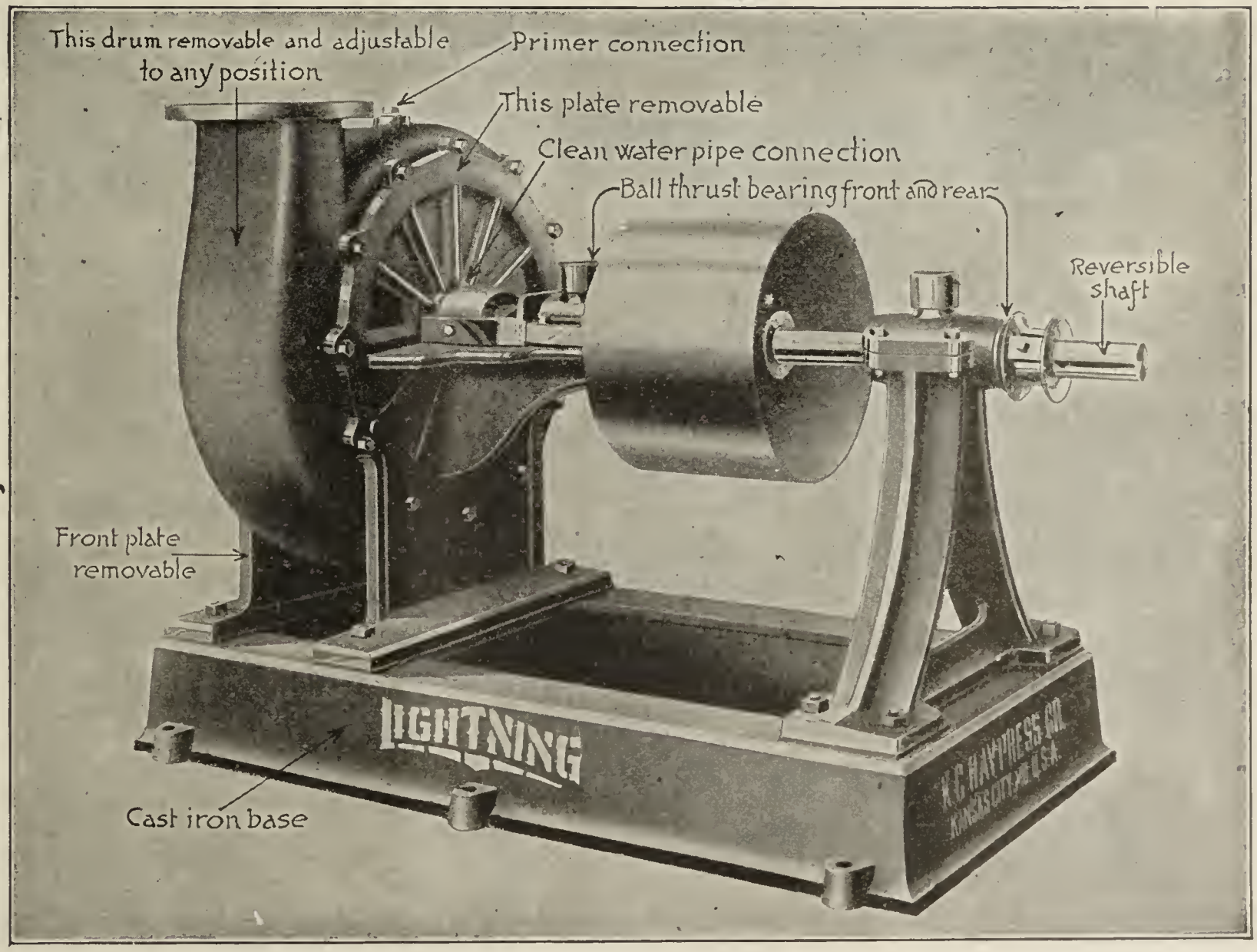
Its rugged construction and Simple operation assures maximum efficiency in operation at all times.

It is easy to adjust and easy to replace parts. Thousands in successful operation are striking endorsement of their dependability.

KANSAS CITY HAY PRESS & TRACTOR COMPANY

KANSAS CITY, MISSOURI

THE PUMP OF SIMPLICITY AND STRENGTH



The Modern Way To Dig and Convey Gravel

Evidence is available to warrant the statement that a Sauerman Dragline Cableway Excavator can dig and deliver to the hopper of a washing and screening plant, any definite tonnage of sand and gravel at a lower per ton cost than is possible with other equipment or combination of equipment.

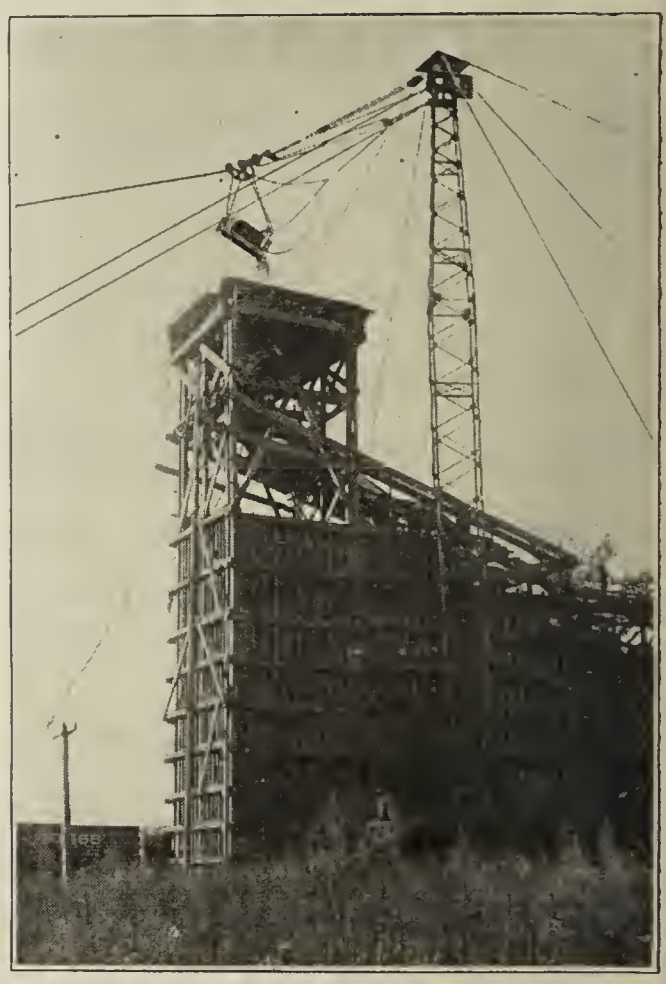
The cost data forming the basis of our claim has been supplied by prominent gravel producers who have operated Sauerman Dragline Cableway excavators for a considerable length of time. Some of these producers employ several of our equipments at different locations with consequent variations in ground conditions and none of the cableways has been favored by especially ideal digging conditions.

If you are figuring on developing a gravel proposition, you too, will find it to your advantage to ask our engineers to submit their recommendations.

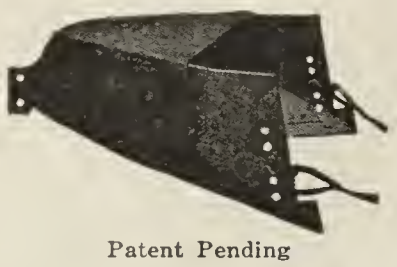
Write for Bulletin No. 14

Sauerman Bros.

1139 Monadnock Bldg., Chicago



Sauerman Dragline Cableway Excavators



Patent Pending

Our Late Development of

POWER DRAG SCRAPER

Is proving its worth

We will shortly be prepared to mail you CONCRETE INFORMATION including photographs and drawings of just what it is doing for others during the present year. This information will be especially valuable at this time when you should be familiar with the most economical methods of excavating.

L. P. GREEN

907 Lumber Exchange Bldg., Chicago

Extraordinary Announcement:

The Breakers

ATLANTIC CITY, N. J.

ON THE OCEAN FRONT **FIREPROOF**

Remarkable Reduction in Rates

From September 19th, 1921

European Plan	American Plan
$2.50 up daily, Single	$42 up weekly, Single
$4.00 up daily, Double	$77 up weekly, Double

Hot and Cold Sea Water in all Baths

Fireproof Garage on Premises

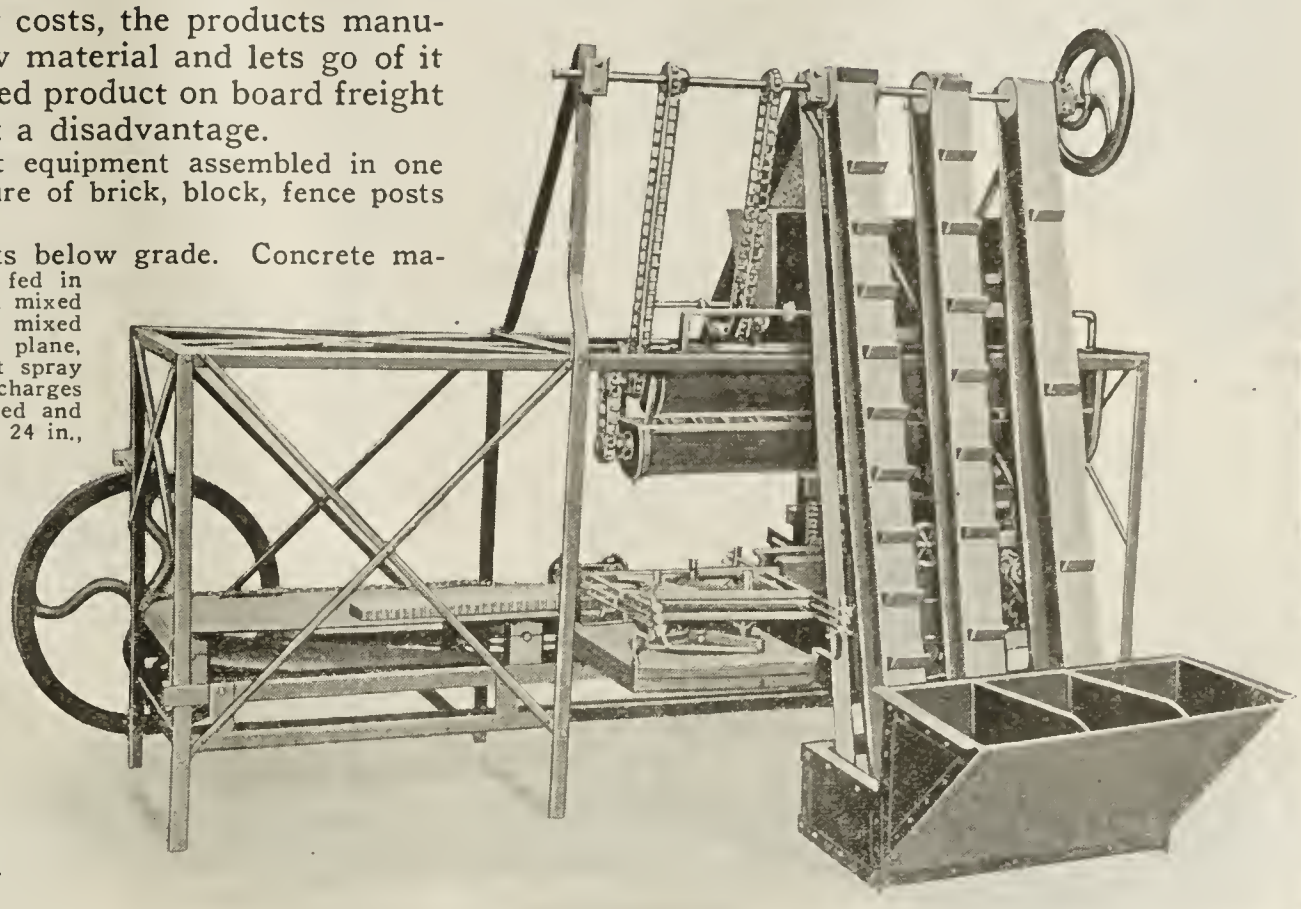
New Golf Club Privileges

A concrete products plant complete in one large swift-running machine

In these days of high labor costs, the products manufacturer who picks up his raw material and lets go of it before he has placed his finished product on board freight cars or trucks, is operating at a disadvantage.

The mogul is a complete plant equipment assembled in one unit for the continuous manufacture of brick, block, fence posts and roofing tile.

It feeds itself from material pits below grade. Concrete materials are automatically measured and fed in exact proportions into a 15-ft. trough and mixed dry, discharged into a 25-ft. trough and mixed dry again, discharged onto an inclined plane, flow in a thin layer under a water mist spray into the moulding machine which discharges onto a traveling belt a core of well mixed and consolidated concrete 2 in. square, or 2 x 24 in., or 12 x 24 in. and this core is cut into brick, block, posts or tile and laid automatically on trolley carriers. The product travels to steam room, hesitates 12 hours and then travels to cars or trucks.



100,000 Brick a Day

Equipment, assembled in a structural steel frame, is 10 ft. wide, 22 ft. high and 30 ft. long. Its capacity is 100,000 brick a day. The concrete core may be split into sills, coping, posts, dimension stone block, roofing tile or brick of any size.

Mogul plants are established where local companies with sufficient working capital, suitable materials and good market are available. Write for our complete proposition.

Mogul Concrete Machinery and Equipment Company
Dorsey, Md.

HETTRICK RED STITCHED
CANVAS BELTING

Made from the highest class duck obtainable, having a tensile strength of 500 pounds to the square inch. Sewed in heavy modern machines with specially made twine. Stretched to the proper degree and treated with gums and oils that preserve the fabric and make the belting soft and pliable under all conditions.

Ask for Samples and Prices

THE HETTRICK MFG. CO. **TOLEDO, OHIO**

Which Do You Manufacture, Sightly or Unsightly Brick?

Make poured concrete brick, the kind of brick that are used for faced work. You can't get anywhere by calling a dry tamped brick a wet brick. To succeed you must have poured brick.

Our circular explains the difference between the poured and dry tamped concrete products.

MERRILL MOORE **CRESTON, IOWA**

REICHERT Adjustable Steel Molds

Improved locking device, saves time. Tight, accurate fit at joints produce smooth finish.

They help you land contracts
You can bid lower, at no loss of profit. Reichert Forms are standardized—units interchangeable. Ask for catalog.

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SAVE CEMENT

Salvage from 5 to 10 sacks of good cement from each 1,000 empty sacks and reduce labor by one-half—by cleaning them in our

Unit Sack Cleaner

Write us for particulars.

Handy Sack Baler Co.
620 S. 2d St.,
Cedar Rapids, Iowa

STIMULATE YOUR BUSINESS

Now is the time to get going. We can help you devise an economical selling plan,—direct by mail—to develop orders and inquiries.

What you need to get the business will be carefully determined by an analysis and you will be given sound advice by an able staff of counselors.

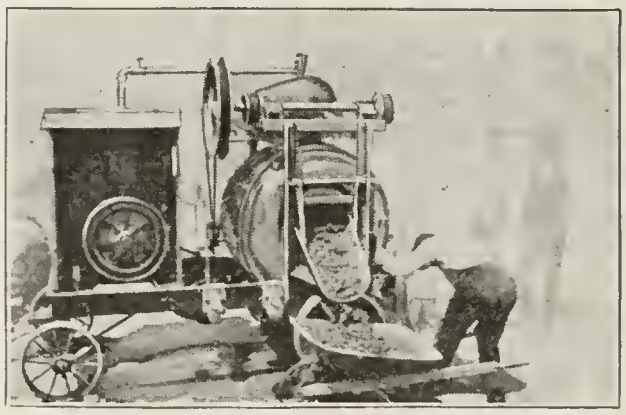
Selling Campaigns Planned, Printed; Guaranteed Mailing Lists Compiled; Addressing and Mailing; Form Letters.

Send for your *free* copy of Direct Advertising List Book.

BUCKLEY DEMENT & CO.
1307 W. Jackson Blvd. CHICAGO

This New Building, Erected, Occupied and Owned by Buckley, Dement & Co., Direct Mail Specialists.

Our Highly Organized Methods and Equipment Are an Asset for Any Advertiser.



THE *Atlas* MIXER

Represents the best established practice in Concrete Mixer Construction.

Its dependability and simplicity commends it to the contractor who appreciates the importance of uninterrupted service.

The Atlas is made in various sizes and styles. Let us mail you our catalogue.

Send for it today—NOW

ATLAS ENGINEERING CO.
3023 Lisbon Ave. Milwaukee, Wis.

P. S.—If you are interested in material handling equipment, let us mail you our ATLAS Wagon Loader, Box Car Loader, Car Unloader, Belt and Bucket Conveyor and Portable Storage Bin catalogue. The catalogue is yours, simply ask for it.

"Perfect" Concrete Block Power Machine

C. S. WERT Inventor and Patentee

Built entirely of steel and iron.
Turns out, with four men, 1,000 to 1,200 concrete blocks in ten hours.

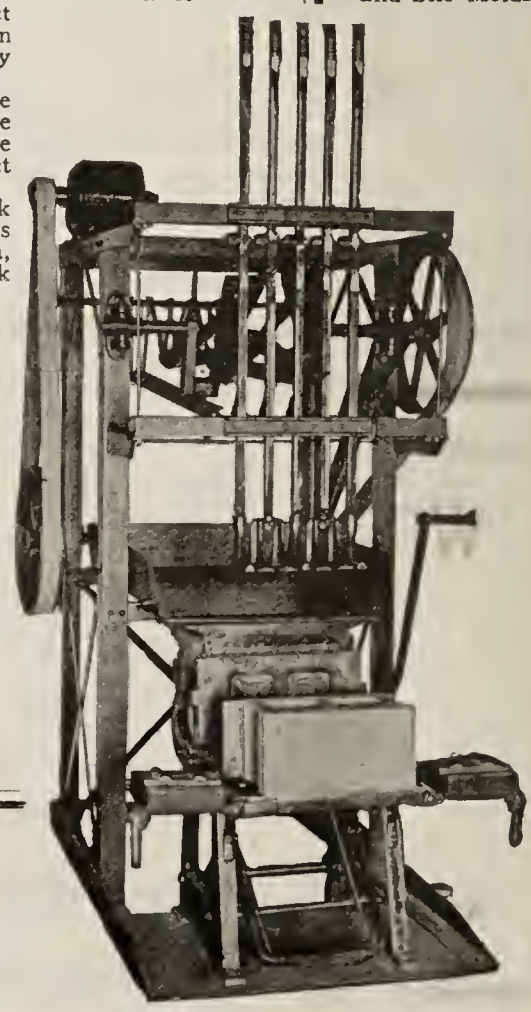
In severe tests, Perfect Concrete Brick have proven stronger than common clay and pressed clay brick.

The power tamper may be operated by a one horse power motor, a 2½ horse power gas engine or direct from a line shaft.

"There is no better brick machine manufactured," says W. T. Sharp, of Montana, owner of a Perfect brick plant.

Also Hand and Power Brick Machines
Hand Brick Machines
Well, Cistern and Silo Molds

Get facts and figures now. Write while the matter is on your mind.



Manufactured by
The Wert Manufacturing Co.
547 Railway Exchange Bldg., Chicago

for facing concrete work

FOR the stucco suburban home—the modern public utility plant and factory—the bank and office building—first call is for Middlebury Terrazzo for facing concrete work.

Middlebury Terrazzo has all the appearance of solid marble—with all its advantages and at a material saving in price.

Made from Middlebury White and Crême Statuary Marbles, it is furnished, carefully graded to size, in either dust, No. 1, 2 or 3.

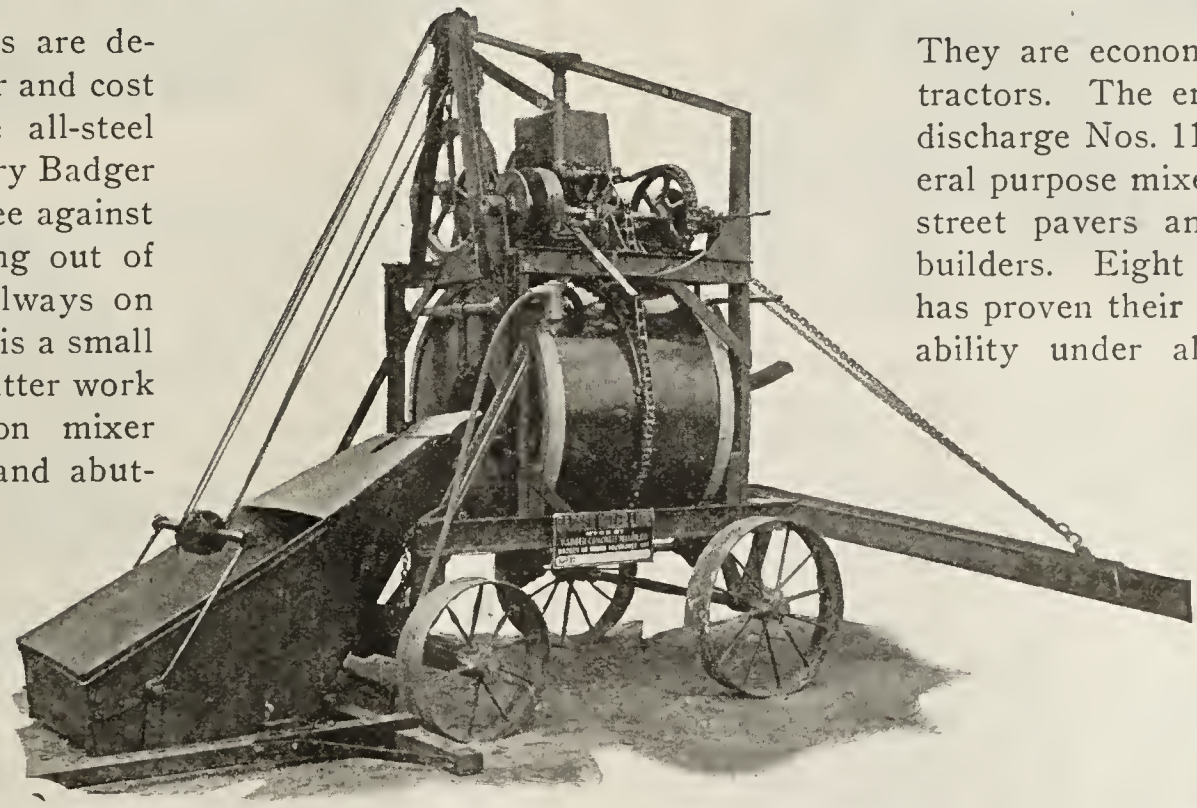
Send today for free samples and prices

Middlebury Marble Company

BRANDON, VERMONT

BADGER MIXERS

The Badger Mixers are designed to save labor and cost of operation. The all-steel construction of every Badger Mixer is a guarantee against breakage or wearing out of parts. They are always on the job, whether it is a small mixer on curb or gutter work or the construction mixer upon foundations and abutments or the alley and street paver. Their light weight and durability has made a distinctive reputation for the Badger Mixer.



They are economical to the contractors. The end load and end discharge Nos. 11 and 15 are general purpose mixers and alley and street pavers and country road builders. Eight years of service has proven their absolute dependability under all conditions of concrete work.

Write for our attractive prices.

The ~ Badger ~ Mixer Line

BADGER CONCRETE MIXER CO., 13th Floor MAJESTIC BLDG. **MILWAUKEE, WIS.**

FABRICATED STEEL PRODUCTS

We specialize on FABRICATED STEEL PRODUCTS and are equipped to furnish steel plate products such as Tanks, Hoppers, Stacks, Conveyors, Chutes, Pipe, Elevator Legs, Coal Mine Equipment, Cement and Concrete Sheet Steel Forms promptly. Let us estimate on your requirements.

CORRUGATED SHEETS ERECTED

We are specialists in furnishing and erecting ROOFING and SIDING of Galvanized, Painted or Zinc sheets, corrugated or formed. Our mechanics are experts—they know how. Let us figure on your erection, no matter where located.

Our complete stock of Galvanized, Black, Blue Annealed Sheet Steel and Zinc enable us to give immediate attention to all orders and inquiries received

THE SYKES COMPANY

930 West 19th Place **CHICAGO, ILL.**

A Complete Steel Trestle

OPEN—Ready for Use.

CLOSED—For Storing or Transporting.

ECONOMY STEEL SCAFFOLDING

is being used by a number of leading Chicago contractors, such as Thompson Starrett Co., R. C. Wieboldt, Blome Sinek, E. W. Sproul & Co., Math Rauen Co., Gerhardt Meyne and many others, who will gladly recommend them to every contractor as a good asset in equipment.

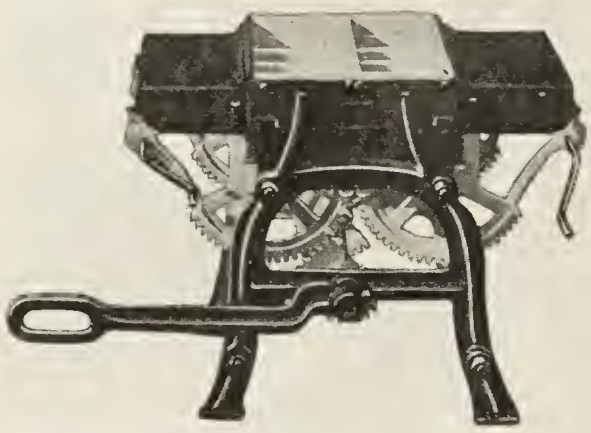
The illustration is of the Mason Horse 4 ft. 6 in. high and 5 ft. 0 in. wide which weighs but 60 lbs., they are sturdy in construction and their compactfulness when folded makes them very easy to handle, transport or store.

A TRIAL ORDER WILL CONVINCE YOU THAT THEY ARE A NECESSITY.

Price $6.00 each, F. O. B. Chicago.

ECONOMY SCAFFOLD CO.

4611-19 West Fulton St. **CHICAGO, ILL.**



Double your daily output with

DOUBLE-SPEED

Brick and Block Machines

Now is the time to increase the capacity of your block plant—turn out the maximum number of wall feet per day, while the demand for building materials is at its highest.

Block Output

Our Double-Speed Block Machine makes in each operation: 2 hollow blocks, 2 silo blocks, 2 solid blocks, 2 slabs, 4 half blocks, 2 water table slabs, 2 return ends, 2 chimney blocks, or 2 porch pier blocks.

Brick Output

Double-Speed Brick Machine makes 16 brick at each operation, 8 brick being delivered at each side of the machine.

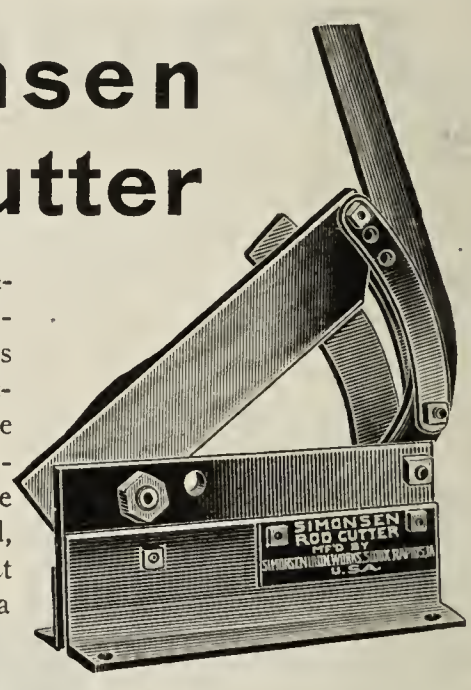
Double Speed Tamper

This power tamper gives our block machine a capacity of 1,500 blocks per day and speeds the brick machine up to 15,000 brick per day. Roller-cut-off removes surplus material from mold box and finishes the top of the product. The block and brick are tamped rapidly and vigorously, resulting in a dense, strong product. Machine consumes little power and is practically fool-proof.

Write for block and brick machinery catalog, Dept. A,

Wood Bros. Thresher Co. Des Moines, Ia.

Simonsen Bar Cutter



Is designed especially to meet the requirements of builders in concrete construction needing a portable shear for cutting reinforcing bars on the job. It's a practical, low-priced shear that will pay for itself in a short time.

NON-BREAKABLE STEEL BODY

Cutting Jaws are of the "welded in" type, our own patented design. Lower or stationary jaw has a keen edge of hardened tool steel and is practically indestructible. Upper jaw does the actual cutting and is hinged at rear end on a heavy case hardened steel pin. It's reinforced.

Made in three sizes. No. 10 weight 75 lbs. Capacity ¾ in. round or ½ in. square twisted. No. 11 weight 125 lbs. Capacity 1 in. round or ¾ in. square twisted. No. 12, weight 175 lbs. Capacity 1¼ in. round or 1 in. square twisted. Shipped set up complete with suitable lever.

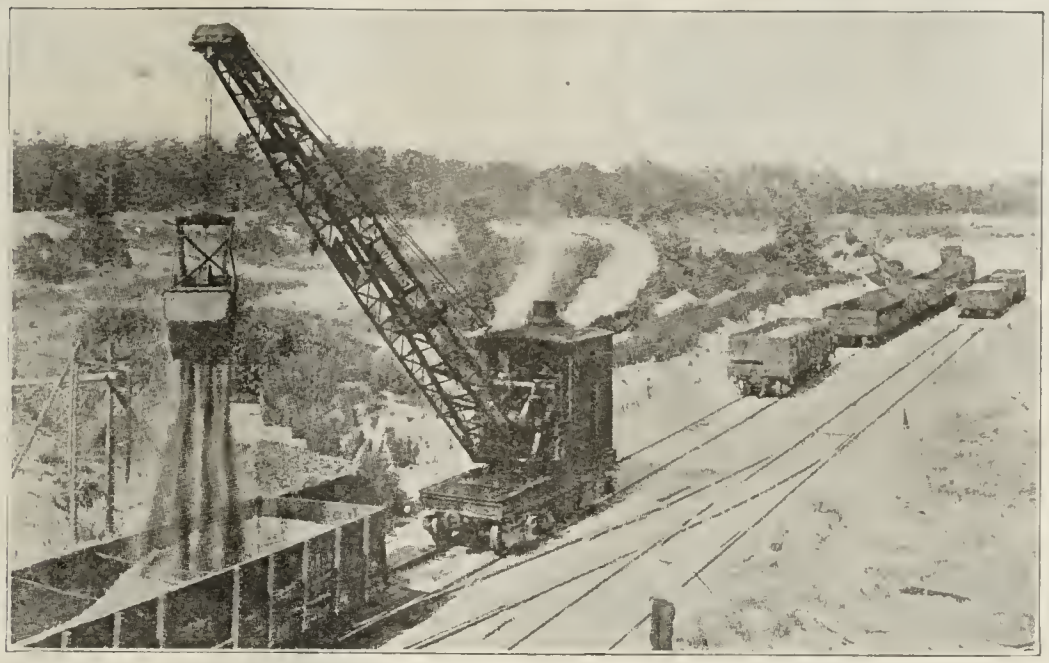
Ask your supply dealer or write us for full information.

SIMONSEN IRON WORKS, Manufacturers

Sioux Rapids Iowa, U. S. A.

CEMENT PLANTS SPECIAL

FOR LEASE



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LOCOMOTIVE CRANES FOR ALL PURPOSES

Steam Shovels, any Size or Capacity — Locomotives, any Gauge, Size or Type

Railroad and Construction Cars. All Types.

Flat, Box, Gondola, Ore, Dump Cars, Interurban Cars, Passenger Coaches, etc.

Railway, Industrial and Contractors Equipment

A. C. TORBERT

Continental and Commercial Bank Building SHOPS AND STORAGE YARDS AT CHICAGO **CHICAGO**

WE ASSEMBLE NEW—WE BUY—WE REBUILD—WE SELL—WE LEASE

WHAT ARE YOUR REQUIREMENTS? PLEASE TELEGRAPH, TELEPHONE OR WRITE US

A REAL PROFIT MAKER

FLEXO CONCRETE MOULDS

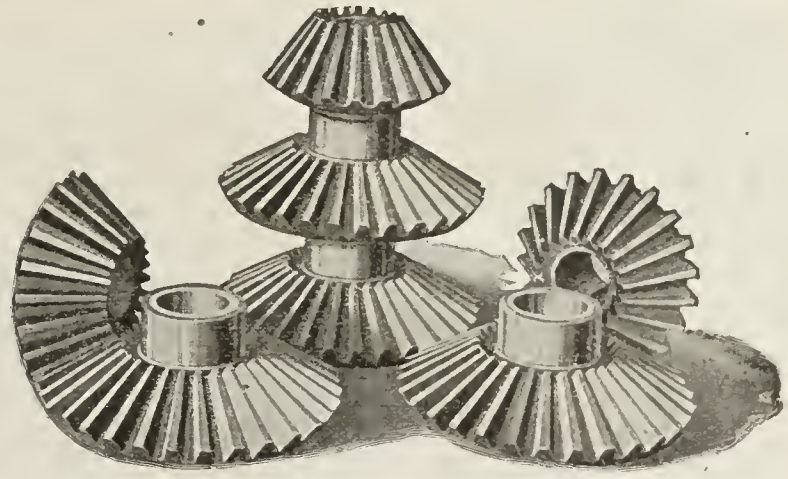
Produce with extreme economy and speed the building stone that sells fastest. It is the final word in the manufacture of slush poured concrete block, plain or faced. Why limit your profits by using a system less perfect. Get behind the FLEXO-CRETE blocks and make more money out of your time and investment.

The moulds are galvanized and rust proof. All parts are interchangeable. Simple, Substantial, Self squaring and easily handled.

Flexo Moulds are manufactured under Patented Rights.

FLEXO CONCRETE MOULD CO.

216 Masonic Temple CEDAR RAPIDS, IA.



Make Your Gear Service a Certainty

Ganschow Bevel Cut Gears—like Ganschow Gears of every kind—are cut with an accuracy and precision which makes smooth, easy, effective working a certainty. They minimize wear and tear and insure long life to the parts. From twenty to forty per cent less power is required to operate

Ganschow Cut Gears

as compared with cast gears, because of evenly-thick and evenly-spaced teeth, and because they are uniformly smooth. Throughout the whole machine the jar and strain are greatly reduced; and this means gear-efficiency from every standpoint.

As specialists in gear work, our splendid facilities enable us to take care of any requirement from the smallest gear up to 12 ft. in diameter—and do it QUICK. Every gear strictly according to specifications and free from defects.

How about YOUR gear requirements?

Wm. Ganschow Company, Chicago, Ill.

1003 W. Washington Street

INLAND

Steel Reinforcing Bars

Three grades: open hearth steel (new billet stock), "medium" and "hard" grade, and rail carbon steel (re-rolled). Both theory and practice agree on the design. Rounded corners prevent splitting of the concrete. Bending, fabricating and setting are easily done with these bars.

Sizes ⅜ to 1¼ inch. Lengths up to 85 feet. Shipments can be made promptly

Inland Steel Company
First National Bank Bldg. CHICAGO

WORKS:
Indiana Harbor, Ind., and Chicago Heights, Ill.

BRANCH OFFICES:
Dallas, Denver, Detroit, Los Angeles, Milwaukee, St. Louis, Kansas City, Mo., St. Paul, San Francisco, Seattle

Laclede Bars for Reinforcing Concrete

Many buyers now take advantage of facilities at mill by ordering bars cut to length, bent to shape, and tagged—ready for placing.

For Particulars Address

Laclede Steel Company

Works:
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IMMEDIATE DELIVERY

Franklin

ROUND—SQUARE—FLAT—SQUARE TWISTED

STEEL BARS
for CONCRETE REINFORCING

We can meet your Reinforcing Steel Requirements. This means not only quick shipment from the mills but co-operative service for rapid transportation. If you want to know just what your exact cost will be, send us the Blue Prints and we will give you a lump sum bid on all the steel sheared to lengths, bent to specifications and delivered to the job,

Our Engineering Department is at your service.

The FRANKLIN STEEL WORKS
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QUALITY SERVICE

Concrete Roads must be reinforced

It is demonstrated beyond doubt that to make concrete roads proof against heavy motor traffic, weather and time, a fabric of steel must be incorporated in the concrete.

Several great states have so ruled.

American Steel & Wire Concrete Company's Reinforcements fulfills every engineering requirement.

Send for our book on road building.

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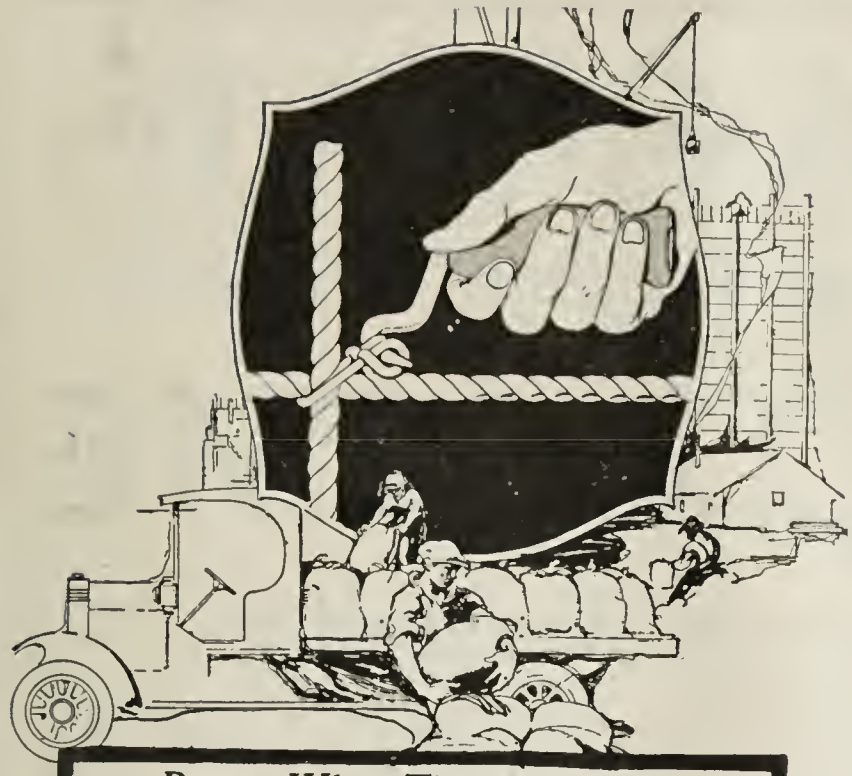


Bates Wire Ties Now Sell At Less Than Pre-War Basis

Write for the new prices on Bates Wiro Ties—they cost you less than ever before—actually priced lower than during the pre-war period.

If you are using the Bates System of Tying, stock up at the new prices.

If you havn't adopted the Bates System yet—**Send for this FREE Trial Bates Rod Tying Outfit.**

The Bates FREE Trial Rod Tying Outfit containing one "Simplex" Hand Tying Tool and 20 each of 4, 5, 6 and 7-inch Bates Wire Ties, will be sent on receipt of your signed agreement to try this Rod Tying Outfit on your work, and then within fifteen days, send us $1.00 or return the tool. These trial ties cost you **NOTHING.**

BATES VALVE BAG COMPANY

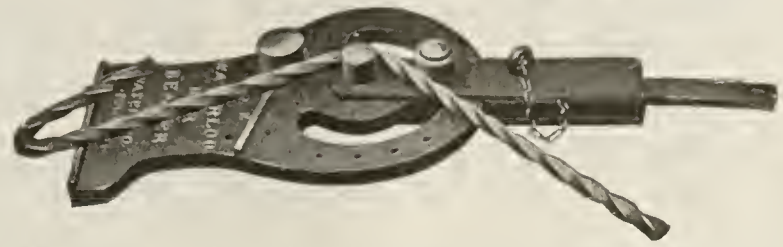
7330 South Chicago Ave., Chicago, Ill.

110 Great Portland St., London, W. I., England

BATES SYSTEM FOR FILLING & CLOSING BAGS

Contractors can't afford to be without

The Waterloo Bar Bending Machine



It's made in 2 sizes, and is guaranteed to bend bars as follows: No. 2 bends cold reinforcing bars including 1⅛ in. round or square. Price $30.00. No. 3 bends cold reinforcing bars including 1¼-in. round or square. Price $35.00.

Bends bars to various angles desired. Has a detachable handle 7 feet long for convenience in handling.

Waterloo Construction Co., Waterloo, Iowa

SAVE CEMENT SACK LOSS

Bale your sacks up tight and right. Keep them baled up all the time. If you have one of our handy sack balers you will do this. We manufacture a cleaner that cleans. Write us for prices and further information.

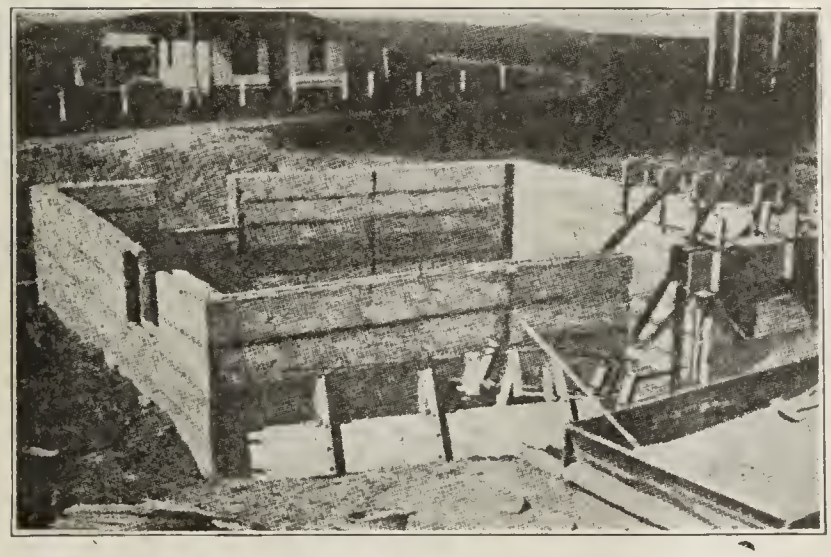
HANDY SACK BALER CO

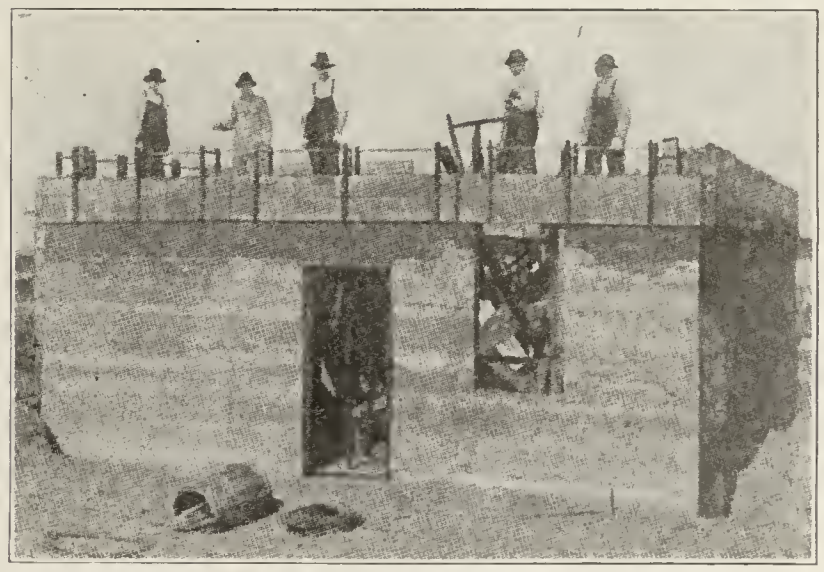
620 S. 2d St.

CEDAR RAPIDS IA.

FROST HOLLOW WALL FORMS

ADJUSTABLE TO ANY KIND OR SIZE OF BUILDING





With our forms you can build a double wall, reinforced concrete building to compete with the cost of frame construction.

Moisture-proof, fire-proof, repair-proof walls. Save paint, lath, time and labor to you. Save repair, fuel and insurance to the owner.

Forms adaptable to any size building, adjustable to any thickness wall. Built of poured concrete, reinforced three ways with continuous dead air space makes the most desirable method of building construction. Simple to use, easily adjustable. No skilled labor required. Method has been tried and proven.

Write for complete description of method and its operation, photos showing work done, and costs.

HOLLOW CONCRETE WALL CO.

H. T. FROST, PRESIDENT

MITCHELL, SOUTH DAKOTA

For Better Concrete, Stronger Mortar—use HYDRATED LIME

Increases Concrete Density

By virtue of its ability to fill the voids, Hydrated Lime increases the density of concrete. The mass becomes more watertight—practically impervious to water. Honeycomb and other structural weakness are also prevented. Hydrated Lime promotes intimate contact of the concrete mass with the forms and produces smooth, pleasing exterior surfaces.

Other Reasons Why You Should Specify and Use Hydrated Lime

because

1. Makes the mixing of Portland cement concrete more easy, inasmuch as it lubricates the sand grains and coarse aggregates.
2. Renders the concrete mix plastic enough to flow freely and smoothly with a minimum of excess water.
3. Makes the concrete easier to work after it is deposited in the forms, thus eliminating labor usually required for spading and tamping against the forms.
4. Eliminates the tendency toward cracking, because it minimizes alternate expansion and contraction due to moisture changes.
5. Promotes uniformity of the mass concrete by producing a colloidal or jelly-like medium through which the rock and matrix do not segregate, thereby producing a stronger concrete.
6. Materially and directly increases the ultimate compressive strength and efficiency of the concrete, by virtue of its ability to hold water in mechanical suspension and thus supplying the necessary moisture required by Portland cement in order properly to set and attain its maximum strength.

Write any of the following competing manufacturers of Hydrated Lime for complete information about Hydrated Lime in Concrete, also for their booklet on the use of Hydrated Lime in Concrete Roads

Ladd Lime & Stone Co., Cartersville, Ga.

Marblehead Lime Co., Chicago—Kansas City

Louisville Cement Co., Louisville, Ky.

Lee Lime Co., Lee, Mass.

White Marble Lime Co., Manistique, Mich.

Glencoe Lime & Cement Co., St. Louis, Mo.

Ste. Genevieve Lime Co., St. Louis, Mo.

Rockland&RockportLimeCorp. New York—Rockland, Maine—Boston

Hunkins-Willis Lime & Cement Co., St. Louis, Mo.

The Western Lime Co., E. & C. Bldg. - Denver, Colo.

Kelley Island Lime & Transport Co., Cleveland, Ohio

National Lime & Stone Co., Carey, Ohio

Luckey Lime & Supply Co., Luckey, Ohio

Ohio Hydrate & Supply Co., Woodville, Ohio

Merion Lime & Stone Co., Norristown, Pa.

American Lime & Stone Co., Tyrone, Pa.

Riverton Lime Co., Riverton, Va.

Vermarco Lime Co., West Rutland, Vt.

Western Lime & Cement Co., Milwaukee, Wis.

J. C. BUCKBEE COMPANY
ENGINEERS
BUILDERS OF CEMENT PLANTS
FIRST NATIONAL BANK BUILDING
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Hydrating Lime—The Kritzer Way
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INDIANAPOLIS
Designing and Consulting Engineer
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6 Eagle Street SCOTIA, N. Y.

C. A. P. TURNER
Mem. Am. Soc. C. E.
CONSULTING ENGINEER
Reinforced Concrete and Structural Steel Bridges, Buildings and Manufacturing Plants
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By Graduate Chemist. Experience in Cement Industry, Chief Chemist, and Construction Work.. Also sales experience in allied line. Would consider position in either Operating or Sales Departments. Address Box 47, c/o Cement & Engineering News, 22 Quincy St., Chicago, Ill.

POSITION WANTED

By competent Cement man as Superintendent, Chief Chemist or Draftsman, 9 years experience. Address Box M, c/o Cement & Engineering News, 22 Quincy St., Chicago.

WANTED

Chief Chemist for small dry process plant located south. Address reference, stating salary. Box M. M. 66, c/o Cement & Engineering News, 22 Quincy St., Chicago.

Practical Cement Manufacturer, 30 years' experience, open to promote and assist in financing meritorious Portland Cement enterprises. Have promoted and financed and erected five cement plants. Give full particulars, location, raw materials and markets available. Would consider management of cement plant. Cement Manufacturer, c/o Cement & Engineering News, 22 Quincy St., Chicago, Ill.

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Mechanical Engineer, 35 years old, 12 years' experience in Cement Plants, desires position as Chief Draftsman, Engineer, or Assistant to Superintendent. Address Box 84, c/o Cement & Engineering News, 22 Quincy St., Chicago, Ill.

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1	50	Westinghouse	750
3	50	Crocker-Wheeler	625
1	50	Northern	550
2	50	Westinghouse	525
1	50	Westinghouse	450
1	60	General Electric	800
1	60	Northern	650
1	75	Westinghouse	850
1	75	Burke	375
1	90	Western Electric	525
1	90	Northern	450
1	100	Allis-Chalmers	850

H.P.		3 Phase, 60 Cycles	Speed
2	60	Western Electric	900
1	75	Gen. Elec.	1800
1	75	Gen. Electric, slip-ring.	900
2	100	Gen. Elec.	1800
2	250	Gen. Elec., 550-volt....	490
6	150	Gen. Elec., slip ring....	600

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Satisfy yourself, write, wire or phone us. Our repair shop most up to date.

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The following prices on 1800 RPM motors are net cash, f. o. b. Chicago, and subject to prior sale. If you desire 1200 RPM add 20% to the following prices:

1 H.P.	$42.00	5 H.P.	$ 72.00
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3 H.P.	58.00	10 H.P.	120.00
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These motors are furnished with pulley and base.

We also have several thousand ¼ H. P. single phase, 60 cy., 110 V., 1750 RPM full load, constant duty motors, complete with cord, plug and pulley at $12.00 each.

Will cheerfully refund—if not satisfied.
Check or money order to accompany order.

GENERAL MOTOR AND MACHINERY CO.
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BECAUSE WE SPECIALIZE ON

Lock Seam Pipe

with the smooth inside surface, having already furnished large quantities for Potash Recovery plants, we are able to give especially careful attention to the construction of this class of Pipe.

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EQUIPMENT PRICED TO SELL QUICK

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10,000 Ft. 6″ Cast Iron Flanged Pipe.
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1—Braun's Laboratory Pulverizer.
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24—Horizontal Steam Boilers, 35 to 180 HP.
24—Steam Engines—6 to 500 HP.
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1—150 K.W. Allis Chalmers Bullock Type 3 phase, 60 cycle, 2300 volt, Modern Revolving Field Type Generator. Complete with Belted Exciter, direct connected to and including a 14¼x18 Right Hand Side Crank Automatic Buckeye Engine, operating 225 RPM. Outfit complete with Gravity Oiling System and Throttle Valve. Also complete with brand new Single Panel Switchboard for the control of the outfit. A beautiful unit in condition like new.....$3,685.00

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7½ H.P. New, 1160 RPM, 220 or 440 volt, 3 phase, 60 cycle, type CS Westinghouse Motor, with base, pulley and compensator....$213.00

7½ H.P. New, 1750 RPM, Ditto..... 193.00
5 H.P. 1160 RPM, Ditto, with base and pulley..... 128.00
5 H.P. 1750 RPM, Ditto 111.00

GENERATORS—A. C.

1—300 KVA, 40 degree Westinghouse, 2300 or 440 volt, 3 phase, 60 cycle, 600 RPM, Revolving Field Type A.C. Generator, with direct connected 6 K.W. Exciter. Complete with sliding base, rheostat, etc. Outfit same as new. Actually in use about one month...$2,250.00

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MOTORS—D. C. 220-230 Volt

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60	H.P.	900	RPM, Bullock compound wound.....	650.00
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15	H.P.	690	RPM, General Electric	250.00
15	H.P.	1100	RPM, Milwaukee compound wound.....	200.00
10	H.P.	1330	RPM, Eck Electric Company.....	150.00
10	H.P.	1210	RPM, Colonial Electric Company.....	150.00
5	H.P.	960	RPM, Crocker Wheeler compound wound.....	110.00
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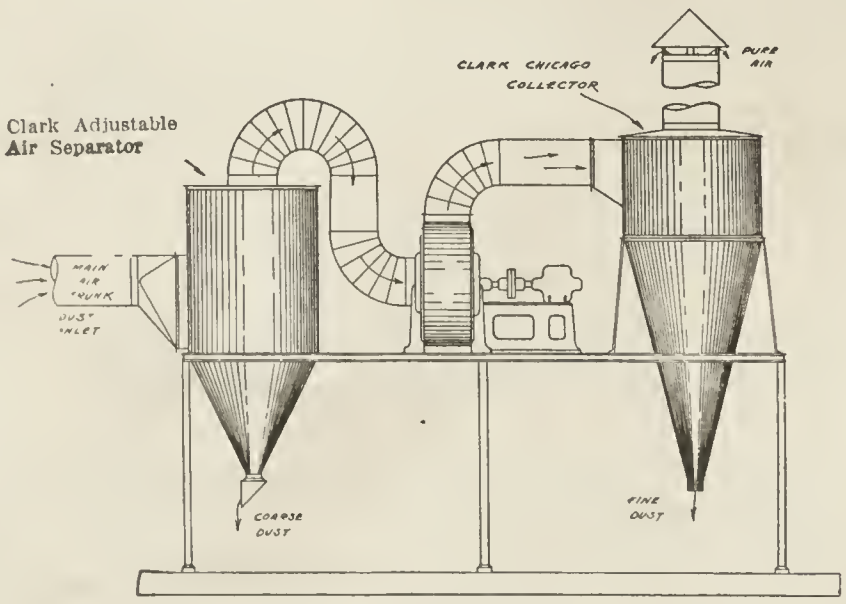

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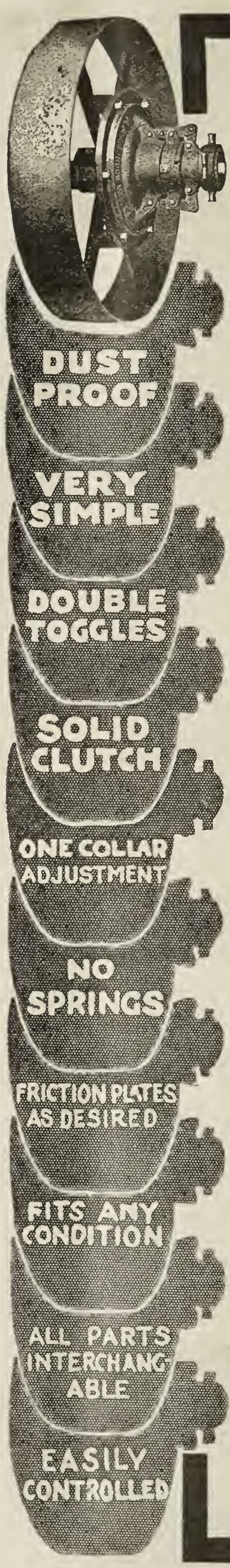

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